5.0 MULTI-PARTY AGREEMENTS

DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

December 20, 2005

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado

Dear Ms. Newton:

Currently the enforceable Implementation Finish milestone date #2 for the Munitions (Testing) Soil Remediation Project is December 29, 2005, (reference letter dated May 05, 2005). In accordance with Paragraphs 26.8-26.18 and 34.22 of the Federal Facility Agreement, the Remediation Venture Office is requesting an indefinite extension of this milestone. This request is primarily due to schedule uncertainties associated with target characterization for the recently added scope of work for the Munitions (Testing) Demolition Range Exclusion Zone. Design Change Notices for this work have not yet been approved by all of the Regulatory Agencies and the initial geophysical survey, which will ultimately define the number of targets to be characterized, has not yet been performed. Other issues associated with this request include the re-scheduling of the final inspection for ESA-4a until after the U.S. Fish and Wildlife Service seeds the area with a warm season cover crop, i.e., sorghum; and the development and implementation of a Conceptual Investigation Plan for the investigation of a potential burial site within ESA-4a. A new enforceable Implementation Finish milestone date will be established as soon as the remaining scope of work is adequately defined. There are currently no critical path ties for completion of the Munitions (Testing) Soil Remediation.

Copies of this letter were forwarded to:

a. Major M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal, DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748.

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203.

c. Mr. Brad Coleman, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite G228, Englewood, Colorado 80112.

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037.

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

January 12, 2006

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado

Dear Ms. Newton:

Currently the Draft Final Design (95 Percent) enforceable milestone date for the Complex (Army) Disposal Trenches – Cover Project is March 2, 2006. In accordance with Paragraphs 26.8-26.18 and 34.22 of the Federal Facility Agreement, the Remediation Venture Office (RVO) is requesting an extension of the 95 Percent deadline to March 30, 2006. The Complex (Army) Disposal Trenches – Cover (CAT) remediation Design is part of the Integrated Cover System Design (ICSD). The ICSD includes the Borrow Area Management Plans for Borrow Areas 3 and 10. The development of these plans depends on the results of the stockpile testing program, comments on the 100 Percent Shell Disposal Trenches – Cover Design, and agreement with the Regulatory Agencies on 2 and 3 foot cover criteria. Due to these remaining issues the RVO is requesting this milestone extension.

Copies of this letter were forwarded to:

a. Major M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal, DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748.

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203.

c. Mr. Brad Coleman, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite G228, Englewood, Colorado 80112.

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037.

e. Mr. Mark Thomson, Washington Group, P.O. Box 1717, Commerce City, Colorado 80022.

f. Mr. Daniel J. Dunn, Holme Roberts and Owens, 1700 Lincoln Street, Suite 4100, Denver, Colorado 80203.

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

February 14, 2006

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Ms. Newton:

Currently the Draft Final Design (95 Percent) enforceable milestone date for the Complex (Army) Disposal Trenches – Cover Project is March 30, 2006. In accordance with Paragraphs 26.8-26.18 and 34.22 of the Federal Facility Agreement, the Remediation Venture Office (RVO) requests an extension of the 95 Percent deadline to June 8, 2006. The Complex (Army) Disposal Trenches – Cover (CAT) remediation Design is part of the Integrated Cover System Design (ICSD). This request is based on the revised schedule for preparing responses to the numerous comments received on the 100 Percent Shell Disposal Trenches – Cover Design; resolution of these comments is required prior to submitting the 95 Percent ICSD. This schedule delay will not affect the overall remedy completion in 2011, however, required funding for critical path, ICS, and non-critical projects (sequenced to fit within the $75 million per year available funding through FY2009 – Program Management Contractor only) may exceed projected funding in an out year if further delays are incurred.

Copies of this letter were forwarded to:

a. Mr. M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal, DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748.

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203.

c. Mr. Brad Coleman, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite G228, Englewood, Colorado 80112.

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037.

e. Mr. Mark Thomson, Washington Group, P.O. Box 1717, Commerce City, Colorado 80022.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

March 30, 2006

Ref: 8EPR-F

Mr. Bruce Huenefeld
Rocky Mountain Arsenal
7200 Quebec Street, Building 111
Commerce City, CO 80022-1748

Re: Miscellaneous RMA Structure Demolition and Removal – Phase II, Rocky Mountain Arsenal

Dear Mr. Huenefeld:

The Environmental Protection Agency (EPA) has completed its review of the Construction Completion Report (CCR) for the Miscellaneous RMA Structure Demolition and Removal Project – Phase II (Project) submitted on March 16, 2006, by the Remediation Venture Office. The CCR, in compliance with OSWER Directive 9355.0-4B (Remedial Design/ Remedial Action Handbook), documents the remedial action activities for the Project which have been accomplished to date, including:

- Completion of all construction items defined in the Project Scope of Work and Final Design Package, as modified, including the status of revegetation efforts which is monitored as part of the annual *Vegetation Management Plan* ;
- Completion of the Project remedy in accordance with the goals established in the 1996 On-Post Record of Decision;
- Conduct of a final inspection by the Colorado Department of Public Health and Environment (CDPHE) and EPA;
- CDPHE concurrence with the CCR via enclosed letter.

Accordingly, EPA approves the CCR as submitted and accepts the Miscellaneous RMA Structure Demolition and Removal Project – Phase II Project as complete.

Sincerely,

Terry L. Anderson
Director, Federal Facilities Program

Enclosure: CDPHE Concurrence Letter

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STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

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Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

March 24, 2006

Mr. Max Dodson
Assistant Regional Administrator
Office of Ecosystem Protection and Remediation
U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405

Re: Miscellaneous RMA Structure Demolition and Removal Project – Phase II Final Construction Completion Report (CCR), Revision 1.

Dear Mr. Dodson:

My staff has reviewed the Miscellaneous RMA Structure Demolition and Removal Project – Phase II Final Construction Completion Report (CCR), Revision 1, dated March, 2006. This report was evaluated for compliance with the objectives described in the Record of Decision, as amended by the Remediation Design and Implementation Schedule. Based upon this evaluation and upon our observations while the work was being performed, I am pleased to inform you of the State's concurrence with the referenced Construction Completion Report.

Sincerely,

Gary Baughman
Director, Hazardous Materials and
Waste Management Division

cc: Bruce Huenefeld, RMA
Roger Shakely, Shell
Tom Jackson, USFWS
Jack Lipschultz, DOJ
Westlyn Erickson, RMA
Lorri Harper, USFWS
Laura Williams, EPA
Ken Conright, TCHD
Richard Lotz, AGO
Brad Coleman, Sentinel Consulting
Susan Newton, CDPHE
File RMA #5.1.1-11

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

March 30, 2006

Ref: 8EPR-F

Mr. Bruce Huenefeld
Rocky Mountain Arsenal
7200 Quebec Street, Building 111
Commerce City, CO 80022-1748

Re: Residual Ecological Risk Soil Remediation – Part 1, Rocky Mountain Arsenal

Dear Mr. Huenefeld:

The Environmental Protection Agency (EPA) has completed its review of the Construction Completion Report (CCR) for the Residual Ecological Risk (RER) Soil Remediation – Part 1, and CCR Addenda for the Miscellaneous Northern Tier Soils, Southern Tier Soils, Existing (Sanitary) Landfill – Section 1, and the Section 26 Human Health and Biota Exceedance Soils Projects submitted on March 14, 2006, and amended by errata pages issued on March 28, 2006, by the Remediation Venture Office. The CCR and Addenda, in compliance with OSWER Directive 9355.0-4B (Remedial Design/ Remedial Action Handbook), document the remedial action activities for the identified Projects which have been accomplished to date, including:

- Completion of all construction items defined in the Project-specific Construction Documentation, as modified, including the status of revegetation efforts which is monitored as part of the annual *Vegetation Management Plan* ;
- Completion of the Project remedies in accordance with the goals established in the 1996 On-Post Record of Decision;
- Conduct of final inspections, as appropriate, by the Colorado Department of Public Health and Environment (CDPHE) and EPA;
- CDPHE concurrence with the CCR via enclosed letter.

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STATE OF COLORADO

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Dennis E. Ellis, Executive Director

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4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

March 29, 2006

Mr. Max Dodson
Assistant Regional Administrator
Office of Ecosystem Protection and Remediation
U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405

Re: Rocky Mountain Arsenal, Residual Ecological Risk Soil Remediation – Part 1 Construction Completion Report.

Dear Mr. Dodson:

My staff has reviewed the Construction Completion Report for the Residual Ecological Risk Soil Remediation – Part 1 at the Rocky Mountain Arsenal. This report was evaluated for compliance with the objectives described in the Record of Decision, as amended by the Remediation Design and Implementation Schedule. Based upon this evaluation and upon our observations while the work was being performed, I am pleased to inform you of the State's concurrence with the referenced Construction Completion Report.

Sincerely,

Gary Baughman
Director, Hazardous Materials and Waste Management Division

cc:
Bruce Huenefeld, RMA
Roger Shakely, Shell
Tom Jackson, USFWS
Jack Lipschultz, DOJ
Westlyn Erickson, RMA
Lorri Harper, USFWS
Laura Williams, EPA
Ken Conright, TCHD
Richard Lotz, AGO
Brad Coleman, Sentinel Consulting
Susan Newton, CDPHE
RMA #22.2

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STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

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4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

March 29, 2006

Mr. Max Dodson
Assistant Regional Administrator
Office of Ecosystem Protection and Remediation
U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405

Re: Construction Completion Report Addenda for Miscellaneous Southern Tier Soils, Basin F Exterior Part 1, Miscellaneous Northern Tier Soils, and Existing Sanitary Landfills 1.

Dear Mr. Dodson:

My staff has reviewed the Construction Completion Report Addenda(s) for Miscellaneous Southern Tier Soils, Miscellaneous Northern Tier Soils, Basin F Exterior Part 1, and Existing Sanitary Landfills 1. The original reports were evaluated for compliance with the objectives described in the Record of Decision, as amended by the Remediation Design and Implementation Schedule, and the addenda were added as requested by your office. Based upon our evaluation of these documents, I am pleased to inform you of the State's concurrence with the referenced Construction Completion Report Addenda.

Sincerely,

Gary Baughman
Director, Hazardous Materials and Waste Management Division

cc: Bruce Huenefeld, RMA
Roger Shakely, Shell
Tom Jackson, USFWS
Jack Lipschultz, DOJ
Westlyn Erickson, RMA
Lorri Harper, USFWS
Laura Williams, EPA
Ken Conright, TCHD
Richard Lotz, AGO
Brad Coleman, Sentinel Consulting
Susan Newton, CDPHE
File RMA #7.6-7, 7.6-6, 7.6-36

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Dennis E. Ellis, Executive Director

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Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

March 24, 2006

Mr. Max Dodson
Assistant Regional Administrator
Office of Ecosystem Protection and Remediation
U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405

Re: CCR Addendum for Section 26 Human Health Exceedance and Biota Exceedance Soils Removal Project

Dear Mr. Dodson:

My staff has reviewed the Construction Completion Report Addendum for Section 26 Human Health Exceedance and Biota Exceedance Soils. This report was evaluated for compliance with the objectives described in the Record of Decision, as amended by the Remediation Design and Implementation Schedule. Based upon this evaluation and upon our observations while the work was being performed, I am pleased to inform you of the State's concurrence with the referenced Construction Completion Report Addendum.

Sincerely,

Gary Baughman
Director, Hazardous Materials and
Waste Management Division

cc: Bruce Huenefeld, RMA
Roger Shakely, Shell
Tom Jackson, USFWS
Jack Lipschultz, DOJ
Westlyn Erickson, RMA
Lorri Harper, USFWS
Laura Williams, EPA
Ken Conright, TCHD
Richard Lotz, AGO
Brad Coleman, Sentinel Consulting
Susan Newton, CDPHE
File RMA #5.1.1-29

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

April 6, 2006

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Ms. Newton:

Enclosed is the Explanation of Significant Differences (ESD) for Groundwater Remediation and Revegetation Requirements Rocky Mountain Arsenal Federal Facility Site, Revision 0. The ESD was presented to the Restoration Advisory Board on March 30, 2006, following a 30 day public comment period. No public comments were received by the close of the comment period. Copies of the signed original are being provided to the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment. The signed original will stay in the Remediation Venture Office permanent record.

Copies of this letter were forwarded to:

a. Mr. M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal (DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748 (w/encl).

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203 (w/encl).

c. Mr. Brad Coleman, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite G228, Englewood, Colorado 80112 (w/encl 2 copies).

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037 (w/encl).

e. Mr. Mark Thomson, Washington Group, P.O. Box 1717, Commerce City, Colorado 80022 (w/o encl).

f. Mr. Daniel J. Dunn, Holme Roberts and Owens, 1700 Lincoln Street, Suite 4100, Denver, Colorado 80203 (w/encl).

g. Mr. Tom Jackson, U.S. Fish and Wildlife Service, Rocky Mountain Arsenal, Commerce City, Colorado 80022-1748 (w/encl).

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EXPLANATION OF SIGNIFICANT DIFFERENCES FOR GROUNDWATER REMEDIATION AND REVEGETATION REQUIREMENTS

ROCKY MOUNTAIN ARSENAL FEDERAL FACILITY SITE

Prepared by:
Tetra Tech EC, Inc.

Prepared for:
Rocky Mountain Arsenal Committee
Department of the Army
Shell Oil Company
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

This document is the property of Rocky Mountain Arsenal Remediation Venture Office and was prepared by Tetra Tech EC, Inc. It is provided on the condition that it will neither be reproduced, copied, or issued to a third party; will be used solely for the intended purpose; and will be used solely for the execution or review of the engineering, remediation, and/or construction of the subject project.

Revision	Prepared By	Reviewed By	Approved By	Date	Pages Affected
0	S. Ache	E. Kaastrup	L. Chen	March 31, 2006	All

00042688 15234 - 3

CONTENTS

ACRONYMS AND ABBREVIATIONS

BANCS	Basin A Neck Containment System
CBSG	Colorado Basic Standards for Groundwater
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CWTP	CERCLA Wastewater Treatment Plant
EPA	U. S. Environmental Protection Agency
ESD	Explanation of Significant Differences
HWL	Hazardous Waste Landfill
ICS	Irondale Containment System
IRA	Interim Response Action
JARDF	Joint Administrative Record Document Facility
NBCS	North Boundary Containment System
NCP	National Contingency Plan
NPL	National Priorities List
NWBCS	Northwest Boundary Containment System
OU	Operable Unit
RAB	Restoration Advisory Board
RMA	Rocky Mountain Arsenal
ROD	Record of Decision
SPNP	South Plants North Plume
STFP	South Tank Farm Plume
TCHD	Tri-County Health Department
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

This Explanation of Significant Differences (ESD) documents a significant change in a portion of the remedy for groundwater contamination and revegetation requirements at the Rocky Mountain Arsenal (RMA) Federal Facility Site. The RMA On-Post Operable Unit (OU) is a federally owned facility located in southern Adams County, Colorado, approximately 10 miles northeast of downtown Denver, directly north of the former Stapleton International Airport and west of Denver International Airport (Figure 1). The RMA On-Post OU site encompasses 17.2 square miles and is currently on the U.S. Environmental Protection Agency (EPA) National Priorities List (NPL) for environmental cleanup as a result of contamination released during previous RMA operations. The groundwater remedy addresses contaminated groundwater located throughout the On-Post OU.

The Record of Decision (ROD), which describes the remedy for the entire On-Post OU of RMA, was signed by the U.S. Army, the EPA, and the state of Colorado on June 11, 1996 (FWENC 1996). The selected remedy includes distinct cleanup projects for soil, structures, and treatment of groundwater contamination (PMRMA 2004). As the site-wide remediation is completed, most of the On-Post OU of RMA will become a National Wildlife Refuge, as provided for in Public Law #102-402(Public Law 1992).

The Army is the lead agency for RMA and is issuing this ESD as part of its responsibilities under Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986, and pursuant to the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Section 300.435(c)(2)(i). The NCP requires an ESD when the remedial action taken differs significantly from the remedy selected in the ROD with respect to scope, performance or cost. Regulatory oversight is conducted by the EPA, Colorado Department of Public Health and Environment (CDPHE), and the Tri-County Health Department (TCHD). The TCHD oversees local public health and environmental issues in Adams, Arapahoe, and Douglas Counties.

The ROD groundwater remedy consists primarily of extraction and treatment of contaminated groundwater through continued operation of existing boundary and on-site treatment systems. In addition, there are limited areas of extraction and treatment of contaminated groundwater to mitigate contaminant sources, such as Section 36 Bedrock Ridge, North of Basin F and Complex Army Trenches. As of December 2005, the Army is proposing to perform additional source treatment in targeted areas. Contaminated groundwater will be extracted from the South Tank Farm Plume (STFP) and the South Plants North Plume (SPNP) in the vicinity of the Lime Basins. Extracted groundwater will be treated at the CERCLA Wastewater Treatment Plant (CWTP) and treated groundwater will be recharged in the vicinity of the extraction well fields.

The ROD groundwater remedy also includes lake-level maintenance or other means of hydraulic containment or plume control to prevent South Plants plumes from migrating into the South Lakes at concentrations exceeding Colorado Basic Standards for Groundwater (CBSGs) in groundwater at the point of discharge. The ROD included a provision that groundwater monitoring would be used to demonstrate compliance. A study conducted to evaluate the

potential for migration of contaminated groundwater plumes into the South Lakes led to the conclusion that contaminated groundwater with concentrations above CBSGs was not migrating into the lakes (USGS 2004). Therefore, the Army is proposing to eliminate from the remedy hydraulic containment, including lake-level maintenance, or other means of plume control, to prevent migration of contaminated groundwater into the lakes.

The ROD soil remedy requires that all sites disturbed during remediation shall have the surface soil reconditioned and be revegetated with locally adapted perennial vegetation. Remedy and support areas completed to date have been revegetated with either temporary or permanent vegetation, and/or have been identified for seeding in accordance with a U.S. Fish and Wildlife Service (USFWS) management plan titled, "RMA National Wildlife Refuge Habitat Restoration Plan" (USFWS 1999) and annual "Vegetation Management Plan" (TtFW 2005, 2004). All revegetated areas were assessed in June 2005 as part of the CERCLA Five-Year Review process. In recognition of the unique status of RMA in which the Refuge Act (Public Law 1992) requires that the majority of the RMA site be transferred to USFWS for use as a National Wildlife Refuge upon completion of the remedy, the Army is proposing to clarify the revegetation requirement for the On-Post OU to require remedy sites located on property that will be transferred to the USFWS be reconditioned and seeded in a manner acceptable to USFWS. Revegetation will still be completed by the Army; however, responsibility for acceptance of revegetation performance and function after seeding will be independently conducted by USFWS as a natural resource trustee for all non-cover refuge and future refuge areas.

These changes, while resulting in the need for an ESD, do not alter the overall hazardous waste management remedy that was selected in the ROD.

This ESD will become part of the Administrative Record as required by the NCP, 40 CFR 300.825(a)(2) (EPA 1990). The Administrative Record is available to the public at the Joint Administrative Record Document Facility (JARDF), located on the RMA in Building 129, Room 2024. The JARDF is open Monday through Friday between Noon and 4 pm or by appointment. The telephone number for the JARDF is 303-289-0362.

2.0 SITE HISTORY, CONTAMINATION AND SELECTED REMEDY

2.1 RMA Operational History

The RMA was established in 1942 by the Army to manufacture chemical warfare agents and agent-filled munitions and to produce incendiary munitions for use in World War II. Following the war and through the early 1980s, the facilities continued to be used by the Army. Beginning in 1946, some facilities were leased to private companies to manufacture industrial and agricultural chemicals. Shell Oil Company, the principal lessee, manufactured pesticides from 1952 to 1982 at the site. Common industrial and waste disposal practices during those years resulted in contamination of structures, soil, surface water, and groundwater.

The On-Post OU is one of two operable units at RMA. The Off-Post OU primarily addresses groundwater contamination north and northwest of RMA. The On-Post OU addresses contamination within the approximately 27 square miles that comprised the original area of

RMA. As of January 2004, 9.4 square miles of the On-Post OU have been determined to meet cleanup requirements and are no longer part of the NPL site. Implementation of the remedy for the remaining 17.2 square miles is ongoing and is scheduled for completion in 2011.

The contaminated areas within the On-Post OU included approximately 3,000 acres of soil, 15 groundwater plumes, and 798 structures. The most highly contaminated areas were identified in South Plants (the central processing area, Hex Pit, Buried M-1 Pits, and the chemical sewers), Basins A and F, the Lime Basins, and the Complex (Army) and Shell Trenches. The primary contaminants found in soil and groundwater in these areas are organochlorine pesticides, solvents, metals, and chemical warfare agent by-products.

The areas with the highest levels and/or the greatest variety of contaminants are located in the central manufacturing, transport, and waste disposal areas. The highest contaminant concentrations tend to occur in soil within five feet of the ground surface, although exceptions are noted, particularly where burial trenches, disposal basins, or manufacturing complexes were located.

The characteristics and locations of the groundwater plumes suggest that the greatest contaminant releases to the groundwater have occurred from Basin A and the Lime Basins, the South Plants chemical sewer, the South Plants tank farm and production area, the Complex (Army) and Shell trenches in Section 36, and the former Basin F. The Motor Pool/Rail Yard and North Plants areas have been other sources of contaminant releases to the groundwater.

2.2 Site Description

2.2.1 South Tank Farm Plume

The STFP is located in the southern half of Sections 1 and 2 on the RMA as shown on Figure 2. Groundwater in the STFP flows principally within the weathered, upper portion of the Denver Formation. Although regional groundwater flow is to the northwest, the presence of a groundwater mound in South Plants directs groundwater flow radially away from South Plants, toward the lakes, in much of Sections 1 and 2. Depending on water levels in the lakes, the lakes may either receive groundwater discharge or contribute to groundwater recharge. Groundwater flow past the lakes joins the regional flow system where it eventually flows toward the north-northwest.

The STFP plume consists of contamination from multiple sources within South Plants. Benzene has the highest concentrations and comprises the majority of the dissolved contaminant mass in groundwater in the STFP with average concentrations approximately 690,000 µg/l. Other contaminants include 1,2-dichloropropane, 1,3-dimethylbenzene, chlorobenzene, ethylbenzene, toluene, xylene, bicycloheptadiene, and dicyclopentadiene.

2.2.2 Lime Basins (SPNP) Groundwater

Groundwater in the Lime Basins area is part of the SPNP identified in the ROD. The plume is located in the southwest corner of Section 36 as shown on Figure 2. Contaminated groundwater flow occurs principally within the saturated alluvium, with lesser flow through the underlying

weathered bedrock. The SPNP originates in the South Plants area and flows past the Lime Basins area, following the flow pattern in Basin A to the north-northwest. Both South Plants and the Lime Basins are identified as contributing sources to contamination in the SPNP (FWENC 1996). The SPNP is part of the Basin A Plume Group, which is captured and treated at the Basin A Neck Containment System (BANCS).

In the Lime Basins area, chloroform is the primary organic component of a groundwater plume with numerous constituents. Chloroform has the highest concentrations and comprises the great majority of the dissolved contaminant mass in groundwater. Other organic contaminants with high concentrations include 1,2-dichlorobenzene, 1,4-dichlorobenzene, benzene, chlorobenzene, acetone and methylene chloride. Total organics concentration averages 325,000 µg/l. In addition, concentrations of arsenic average approximately 45,000 µg/l, contributing to the overall contaminant mass in the Lime Basins area.

2.3 Summary of the Selected On-Post Remedy

The overall remedy required by the 1996 ROD for the On-Post OU includes the following:

- Interception and treatment of contaminated groundwater at the three existing on-site treatment plants
- Construction of a new Resource Conservation and Recovery Act - and Toxic Substances Control Act-compliant hazardous waste landfill (HWL) on-post
- Demolition of structures with no designated future use and disposal of the debris in either the new, on-post HWL or the Basin A consolidation area, depending upon the degree of contamination
- The contaminated soil at RMA is addressed primarily through containment in the on-post HWL or under caps/covers, or through treatment depending upon the type and degree of contamination. Areas that have caps or covers require long-term maintenance and will be retained by the Army. These areas will not become part of the wildlife refuge.
- The Basin A disposal area is used for consolidation of biota risk soil and structural debris from other RMA contamination areas and is covered with a soil cover including a biota barrier.

2.4 Summary of the Selected Remedy for Actions Related to this ESD

The ROD identifies the following major remedial actions relevant to this ESD:

- Any time vegetation is disturbed during remedial construction, the disturbed areas will be revegetated consistent with a USFWS refuge management plan. Remedy components for all sites include reconditioning the surface soil and revegetating areas disturbed during remediation with locally adapted perennial vegetation.
- If any additional sites are identified, the remedy will be implemented as follows: It will include revegetation of a type specified by USFWS; if the initial revegetation is not successful, the appropriate adjustments will be made and revegetation again implemented...locations and timing of remediation are to be determined with

consideration of and in coordination with USFWS refuge management plans and activities.

- Operation of the three boundary systems, the North Boundary Containment System (NBCS), Northwest Boundary Containment System (NWBCS), and Irondale Containment System (ICS), continues. These systems include extraction and recharge systems, slurry walls (NBCS and NWBCS) for hydraulic controls, and carbon adsorption for removal of organics. The systems will be operated until shutoff criteria are met.
- Operation of existing on-post groundwater Interim Response Action (IRA) systems continues. The Motor Pool and Rail Yard IRA systems, which pipe water to ICS for treatment, will be shut down when shutoff criteria are met. The Basin F extraction system (North of Basin F) continues to extract water that is treated at the Basin A Neck system and the Basin A Neck system continues to extract and treat water from Basin A until shutoff criteria are met.
- Lake-level maintenance or other means of hydraulic containment or plume control will be used to prevent South Plants plumes from migrating into the lakes at concentrations exceeding CBSGs in groundwater at the point of discharge. Groundwater monitoring will be used to demonstrate compliance.

In addition, the ROD indicates that caps or covers installed in South Plants and Basin A as part of the soil remedy minimize infiltration of precipitation, thereby reducing contaminant migration through lowering of the water table (passive dewatering). The ROD also requires the continued operation of the CWTP to support remediation activities.

3.0 BASIS FOR THE ESD

The following sections provide a discussion of the basis for proposing additional groundwater contaminant reduction, deletion of lake level maintenance requirements, and clarification of soil revegetation requirements.

3.1 Basis for Addition of Groundwater Contaminant Reduction

The ROD groundwater remedy includes extraction and treatment of contaminated groundwater through continued operation of existing boundary and on-site treatment systems. In addition, there are limited areas of extraction and treatment of contaminated groundwater to mitigate contaminant sources, such as Bedrock Ridge, North of Basin F, and Complex Army Trenches. Furthermore, caps or covers installed in South Plants and Basin A as part of the soil remedy minimize infiltration of precipitation, thereby reducing contaminant migration through lowering of the water table (passive dewatering). As of December 2005, the Army is proposing to perform additional source treatment in targeted areas of the On-Post OU. Although this additional contaminant reduction effort is not required for protection of human health and the environment, the reduction of contaminants will enhance the overall effectiveness of the groundwater remedy.

In order to provide the greatest benefit, the Army considered several factors that formed the basis for selecting the source areas for the contaminant reduction effort:

- Areas with the highest concentrations of contaminants in groundwater

- Potential to reduce contaminant load to existing downgradient containment systems or provide accelerated contaminant degradation
- Ability to treat the concentrations of contaminants and use of existing treatment capacity
- Proximity of the areas with high contaminant concentrations to a treatment facility

Two areas were selected by the Army for the proposed contaminant reduction: the STFP benzene plume and the SPNP in the Lime Basins area. The STFP has average concentrations of approximately 690,000 µg/l benzene with total organic concentration approaching 700,000 µg/l. Groundwater in the vicinity of the Lime Basins has average concentrations of approximately 325,000 µg/l total organics, primarily chloroform, and approximately 45,000 µg/l arsenic. These two areas represent the highest historic and current groundwater contaminant concentrations on RMA. Selection of these high contaminant concentration areas provides the potential to maximize the contaminant reduction that can be realized through extraction and treatment of contaminated groundwater.

Reduction in concentrations of organic compounds and arsenic in the vicinity of the Lime Basins will reduce the contaminant load at the BANCS that is downgradient of the contamination reduction system. Reducing the contaminant load will enhance the capability of the treatment system to achieve CSRGs. Extraction and treatment of benzene-contaminated groundwater and the addition of an oxygen source to the treated groundwater prior to reinjection will accelerate the existing biological processes in the STFP to further reduce benzene concentrations.

The availability of an existing treatment facility was critical to the effective implementation of this contaminant reduction effort. Although constructed under an IRA, the CWTP was identified in the ROD for continued operation to support remediation activities. However, the CWTP is no longer required for day-to-day remedy support of RMA remedy projects, making it available to support the contaminant reduction effort. In addition, the CWTP requires only minimal changes to accept contaminated groundwater from the STFP and Lime Basins area as existing treatment processes are capable of effectively treating contaminated groundwater from both sources. The ROD also identifies the CWTP as a structure to be demolished, therefore treatment will occur through June 30, 2010, or until the CWTP is decommissioned, whichever is longer.

Proximity of the contaminated groundwater source area to the available treatment facility was also considered to minimize the complexity of conveying the contaminated groundwater to the treatment facility and the treated groundwater back to the extraction area for reinjection. Both the STFP and Lime Basins areas are within one mile of the CWTP, making them attractive candidates for contaminant reduction.

Consideration of these factors resulted in the proposal to initiate contaminant reduction in the STFP, in the area of elevated benzene concentrations, and SPNP in the Lime Basins area.

3.2 Basis for Removing the Lake Level Maintenance Requirement

The ROD groundwater remedy states "Lake-level maintenance or other means of hydraulic containment or plume control will be used to prevent South Plants plumes from migrating into

the lakes at concentrations exceeding CBSGs in groundwater at the point of discharge. Groundwater monitoring will be used to demonstrate compliance."

Historical water quality data collected during the Remedial Investigation indicated that groundwater plumes emanating from South Plants could potentially impact Lake Ladora. Although Lake Ladora appears to be the main concern, the language in the ROD is not limited to Lake Ladora and pertains to Lake Mary and Lower Derby Lake as well. Therefore, an extensive evaluation of hydrogeological and chemical conditions of the South Plants/South Lakes area was conducted during development of the South Lakes Sampling and Analysis Plan for Groundwater (USGS et al 2001). The conclusion presented in the SAP was that the ROD requirement for South Lakes groundwater would be met by investigating plume impacts to Lake Ladora only, as there was minimal potential for adverse impact to the other lakes.

Lake Ladora was drained for dam reconstruction in 1998 and was dry from June 1998 to October 1998. The period when the lake was dry represented a worst case scenario with regard to groundwater discharge into the lake and lack of lake level maintenance to prevent plume migration. During that period, concentrations of contaminants detected in groundwater samples from two seeps in the lake bed and monitoring wells were below each contaminant's respective CBSG.

The monitoring program for Lake Ladora was conducted between 2001 and 2003 and consisted of monthly and quarterly groundwater sampling and water level measurements. During this monitoring, concentrations of contaminants in the lake point-of-compliance wells, representing the discharge points, were below the CBSGs and not related to water levels in Lake Ladora (USGS 2004).

The results from the South Lakes groundwater investigation led to the conclusion that lake-level maintenance or other means of hydraulic containment or plume control are not necessary to prevent plume migration into the lakes at concentrations exceeding CBSGs (USGS 2004). Therefore, the Army is proposing to eliminate from the remedy hydraulic containment, including lake-level maintenance, or other means of plume control, to prevent migration of contaminated groundwater into the lakes. Lake-level maintenance during remediation is still required to support aquatic ecosystems in Lake Ladora, Lake Mary and Lower Derby Lake (FWENC 1996). The Interim Rocky Mountain Arsenal Institutional Control Plan (IRMAICP) (under development) addresses the management of contaminated HHE sediments in Lower Derby Lake as remediation takes place. In addition, groundwater monitoring will be conducted as part of the long-term monitoring program for groundwater to assess any change in future conditions.

3.3 Basis for Changing Revegetation Requirement

EPA's remedy selection process requires consideration of the future use of the property when developing potential remedy alternatives. For RMA, Public Law 102-402 ("Refuge Act") dictates that the majority of the RMA site be transferred to USFWS for use as a National Wildlife Refuge upon completion of the remedy (Public Law 1992). Consistent with this mandate, Section 9.3 of the RMA On-Post ROD states that, "Remedy components for all sites include reconditioning the surface soil and revegetating areas disturbed during remediation with

locally adapted perennial vegetation." Section 9.4 of the On-Post ROD adds additional requirements for BAS-identified areas as follows: "If any additional sites are identified, the remedy will be implemented as follows: ... It will include revegetation of a type specified by USFWS; if the initial revegetation is not successful, the appropriate adjustments will be made and revegetation again implemented ... locations and timing of remediation are to be determined with consideration of and in coordination with USFWS refuge management plans and activities. Further, Section 7.1 of the On-Post ROD states, "Any time vegetation is disturbed during remedial construction, the disturbed areas will be revegetated consistent with a USFWS refuge management plan."

Because revegetation is a remedy component of the On-Post ROD, assessment of the revegetation must be conducted to determine if it has been adequately completed. Assessment of the revegetation is required for both the ROD as well as the known future use of RMA as a Wildlife Refuge. As a natural resource trustee and land manager of the Refuge, the USFWS is ideally suited to independently assess the revegetation performance and function. Therefore, the Army is proposing to clarify the revegetation requirement for the On-Post OU remedy to require remedy sites located on property that will be transferred to the USFWS be reconditioned and seeded in a manner acceptable to the USFWS.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES

The following sections summarize the changes to the ROD-identified revegetation and groundwater remedy requirements and discuss the cost impact of the revised remedy. The changes described do not alter the hazardous waste management remedy selected in the ROD and the remedy remains protective of human health and the environment.

4.1 Changes to Remedy

The change to the groundwater remedy consists of the installation of a contaminant reduction system for the STFP and Lime Basins (SPNP) contaminant source areas. Treatment of extracted groundwater will be performed at the CWTP and treated groundwater will be recharged in the vicinity of the extraction well fields. The extracted groundwater will be treated to substantially reduce hazardous constituents prior to reinjection. Reinjection of this water to the respective source area has been authorized by EPA's Underground Injection Control Program. The design, construction and monitoring of the extraction systems will ensure that the groundwater reinjection will not cause the contaminant plumes to migrate beyond current conditions. A summary of the modifications to the groundwater remedy area is presented on Table 1.

Another change to the groundwater remedy consists of the elimination of the requirement for hydraulic containment, including lake-level maintenance, or other means of plume control, to prevent migration of contaminated groundwater into the lakes. However, lake-level maintenance is still required to support aquatic ecosystems in Lake Ladora, Lake Mary and Lower Derby Lake. In addition, groundwater monitoring will be conducted to assess any change in future conditions.

A change to the soil remedy will clarify vegetation requirements for remedy sites located on property that will be transferred to the USFWS. Sites will be reconditioned and seeded in a manner acceptable to the USFWS consistent with the USFWS management plan titled, "RMA National Wildlife Refuge Habitat Restoration Plan" (USFWS 1999) and annual "Vegetation Management Plan" (TtFW 2005, 2004). For areas disturbed during the remedy, the USFWS, as a natural resource trustee and future land manager, will certify, in writing, to the EPA that the site has been revegetated or has a USFWS-approved revegetation plan that is being implemented, and that the USFWS is satisfied that the site's habitat is being or will be restored to achieve the statutory purposes of the Refuge. This revision to the remedy applies to all sections of the ROD that discuss revegetation as a component of the remedy common to soil sites that will be transferred to the USFWS.

Table 1: Changes to Groundwater and Revegetation Remedy

ROD-Prescribed Remedy	Modification
Boundary Treatment Systems	**No Change.** Boundary treatment systems continue to operate in accordance with the ROD.
Basin A Neck Containment System	**No Change.** The BANCS continues to operate in accordance with the ROD.
Install extraction system in the Section 36 Bedrock Ridge area. Treat extracted water at the BANCS.	**No Change.**
Source Treatment/Contaminant Reduction	**Addition.** Installation of contaminant reduction systems for South Tank Farm Plume and South Plants North Plume. The contaminant reduction system will consist of extraction and treatment of contaminated groundwater in both areas and reinjection of treated water to the respective source area. In addition, groundwater monitoring associated with the contaminant reduction systems will be conducted.
Continued operation of the CERCLA Wastewater Treatment Plant to support remediation activities	**No Change.** The CWTP will be used to treat extracted groundwater for contaminant reduction.
South Lakes Monitoring	**No Change.** Groundwater monitoring will be conducted under a long-term groundwater monitoring program to ensure continued compliance with objectives established for contaminant migration and the lack of changed groundwater conditions in the future.
Lake-level maintenance	**Delete** the requirement for hydraulic containment, including lake-level maintenance, or other means of plume control, to prevent migration of contaminated groundwater into the lakes.
Remedy components for all sites include reconditioning the surface soil and revegetating areas disturbed during remediation with locally adapted perennial vegetation.	**Clarification.** Sites will be reconditioned and seeded in a manner acceptable to the USFWS consistent with the USFWS management plan and annual "Vegetation Management Plan." For areas disturbed during the remedy, the USFWS will certify, in writing, to the EPA that the site has been revegetated or has a USFWS-approved revegetation plan that is being implemented, and that the USFWS is satisfied that the site's habitat is being or will be restored to achieve the statutory purposes of the Refuge.

4.2 Summary of Cost Change

The addition of this source groundwater extraction and treatment remedy results in a cost increase compared to the ROD-estimated cost. The baseline estimated cost for implementation of the groundwater remedy is $180 million based on cost estimates presented in the ROD (FWENC 1996). The baseline estimate represents original ROD estimated costs reorganized to reflect implementation project descriptions in the Remediation Design and Implementation Schedule (PMRMA 2004). The estimated design cost for implementation of the additional groundwater extraction and treatment is $ 5.8 million, including capital construction costs and operation costs for the treatment facility. This represents a 3 percent increase from the ROD-estimated cost and is not considered a significant change. Major cost elements for the additional extraction and treatment are installation of extraction/recharge wells, treatment system modifications, additional groundwater monitoring costs and treatment system operational costs.

5.0 SUPPORT AGENCY COMMENTS

The EPA, CDPHE, and TCHD have reviewed this ESD. Comments from these Agencies have been incorporated into the document.

6.0 PUBLIC PARTICIPATION COMPLIANCE

The Army published a public notice in the Rocky Mountain News and Denver Post on February 24, 2006, making this draft ESD available for public review and comment. Notices were also published in the Commerce City Beacon, Brighton Blade and Far NE Reporter. A presentation explaining the proposed changes contained in the ESD was provided to the RMA Restoration Advisory Board (RAB) on March 30, 2006. The RAB is a community group that meets periodically to receive information and provide input on the cleanup being conducted at the RMA. The public comment period closed on March 27, 2006 and no comments were received. The requirements set out in the NCP, Section 300.435(c)(2)(ii), have been met.

This ESD and all documents that support the changes and clarifications are part of the Administrative Record and are available at the JARDF and the EPA Region 8 Superfund Record Center. The JARDF is open Monday through Friday between Noon and 4 pm or by appointment. The telephone number for the JARDF is 303-289-0362. The EPA Superfund Record Center can be reached at 303-312-6473. Hours of operation are Monday through Friday from 8 a.m. to 4:30 p.m.

7.0 STATUTORY DETERMINATIONS

Considering the new information presented in this ESD, the Army, in consultation with EPA and CDPHE, believes that the groundwater remedy and the soil remedy, with the modifications described, satisfy the requirements of CERCLA Section 121 and are protective of human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, use a permanent solution through extraction and treatment of contaminated groundwater, and are cost effective.

Signatures

For U.S. Environmental Protection Agency

Date 3.31.06

Terry L. Anderson
Director, Federal Facilities Program

For U.S. Army

Date 3/31/06

Charles T. Scharmann
Program Manager for Rocky Mountain Arsenal

For State of Colorado

Date 3/31/06

Gary W. Baughman
Director, Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

8.0 REFERENCES

Ebasco (Ebasco Services Incorporated)

1992 (Jan.) *Remedial Investigation Summary Report.* Version 3.2.

EPA (U.S. Environmental Protection Agency)

1990 (Mar. 8) *National Oil and Hazardous Substances Pollution Contingency Plan.* Final Rule. 40 CFR Part 300. Federal Register 55 (46): 8666-8865.

FWENC (Foster Wheeler Environmental Corporation)

1996 (June) *Record of Decision for the On-Post Operable Unit.* Version 3.1. (3 v).

PMRMA (Program Manager Rocky Mountain Arsenal)

2004 (Feb.) *Remediation Design and Implementation Schedule.*

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1992 (Oct. 9) Rocky Mountain Arsenal National Wildlife Refuge Act of 1992.

TtFW (Tetra Tech FW, Inc.)

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2004 (Mar. 3) *2004 Vegetation Management Plan.*

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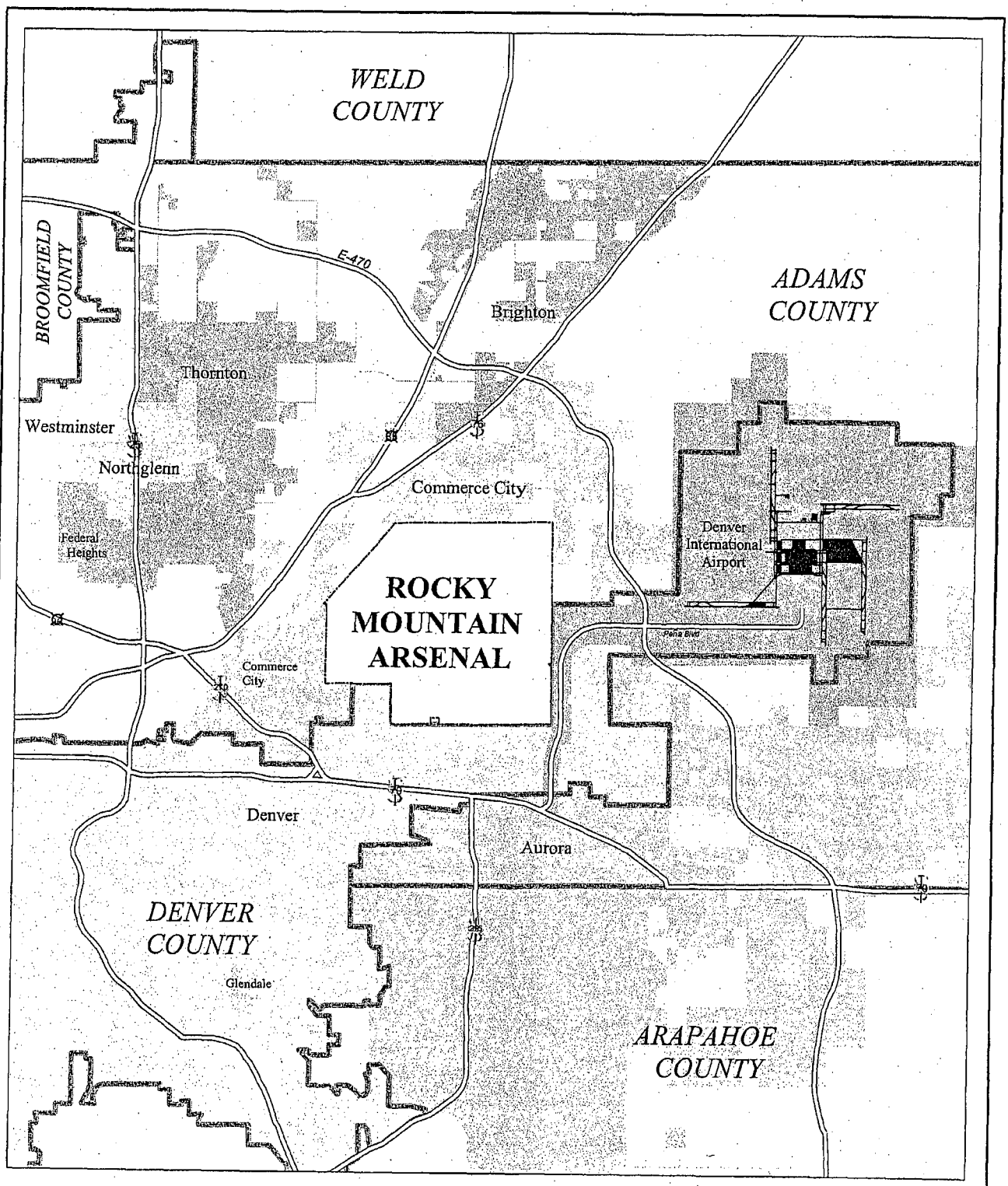
2001 (May) *South Lakes Sampling and Analysis Plan for Groundwater*, Revision 1.

USGS (US Geological Survey)

2004 (Mar.) *South Lakes Ground Water Monitoring Report, June 1, 2001 – May 31, 2003.* Final.

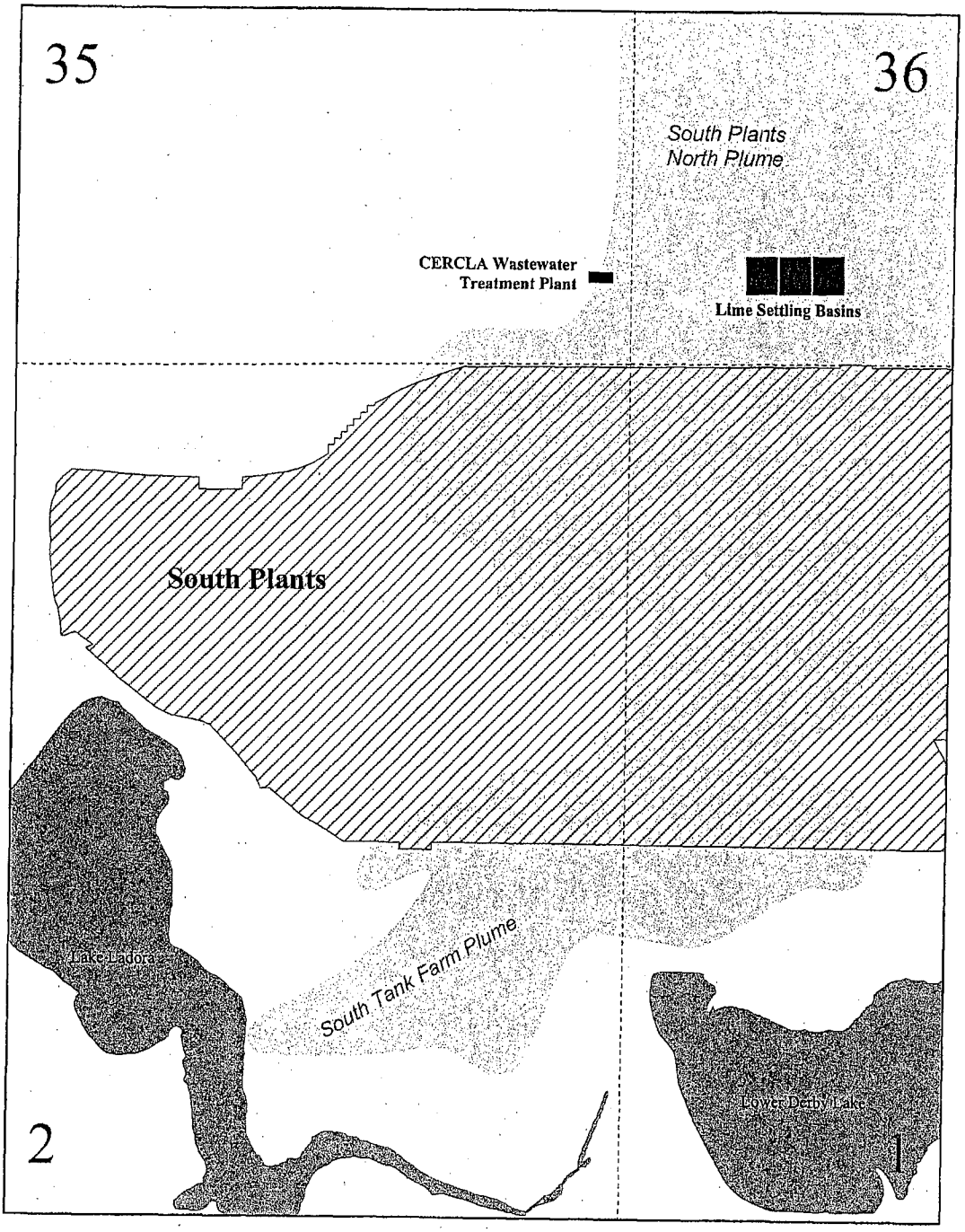


ROCKY MOUNTAIN ARSENAL
Regional Reference

0 1 2 3 4
Miles

Figure 1

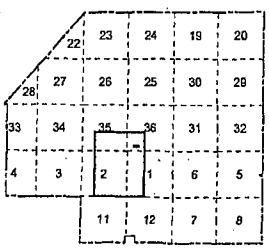
Map Document: D:/usr2/Map Documents/regional_ref-bw.mxd Printed: August 18, 2004

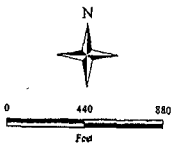


ROCKY MOUNTAIN ARSENAL

ROD Identified
Groundwater Plumes

Total Organics Plume





Lambert Conic Conformal Projection
State Plane Coordinate System
Colorado North Zone - NAD 1927

Figure 2

Map Document: (M:\gis Documents\ROD_Groundwater Plumes.mxd) Date Printed: December 21, 2005

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STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

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APR 4/2006

Colorado Department
of Public Health
and Environment

April 17, 2006

Bruce Huenefeld
Office of the Program Manager
Rocky Mountain Arsenal
AMXRM-PM, Building 111
Commerce City, CO 80022-1748

Re: CDPHE/EPA Rocky Mountain Arsenal, Trust Fund Work Group Summary of Work

Dear Mr. Huenefeld:

Enclosed are three copies of the CDPHE/EPA Trust Fund Work Group Summary of Work ("Trust Fund Document") for your records. I can be reached by phone at (303) 692-3321, or by email at susan.newton@state.co.us.

Sincerely,

Susan Kay Newton
RMA Project Manager
Colorado Department of Public Health and Environment

cc: Laura Williams, EPA (3 copies)
Roger Shakely, Shell (3 copies)
Tom Jackson, USFWS (3 copies)
Dan Collins, TCHD (3 copies)

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APR 0 3 2006
HAZARDOUS MATERIALS
AND WASTE MANAGEMENT

Rocky Mountain Arsenal

Trust Fund Work Group
Summary of Work

March 2006

Prepared by:
Pacific Western Technologies, Ltd.
in cooperation with the
Colorado Department of Public Health and Environment

Prepared for:
U.S. Environmental Protection Agency

00042767 15267 - 2

TABLE OF CONTENTS

Acronyms

CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COLOTRUST	Colorado Local Government Liquid Asset Trust
DA	Department of the Army
ELF	Enhanced Hazardous Waste Landfill
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
HWL	Hazardous Waste Landfill
MOA	Memorandum of Agreement
NPL	National Priorities List
O&M	Operations and Maintenance
OMB	Office of Management and Budget
OU	Operable Unit
PRP	Potentially Responsible Party
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RMA	Rocky Mountain Arsenal
ROD	Record of Decision of the On-Post Operable Unit
SACWSD	South Adams County Water and Sanitation District
SSAB	Site-Specific Advisory Board
SQI	Submerged Quench Incinerator
TSCA	Toxic Substances Control Act
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
U.S. Op. OLC	Opinion of the Office of the Legal Counsel, United States Department of Justice

1.0 INTRODUCTION

The purpose of this report is to document the efforts conducted by the Rocky Mountain Arsenal (RMA) Trust Fund Work Group to establish a trust fund for the operation and maintenance of the remedy at RMA. The report includes a brief history of RMA and the Record of Decision for the On-Post Operable Unit (ROD), a summary of the Trust Fund Work Group's recommendations and activities, and the outcome of these recommendations. Key work products and correspondence of the Trust Fund Work Group are included in the Appendices.

1.1 RMA Site History, Contamination and Selected Remedy

RMA was established in 1942 by the Army to manufacture chemical warfare agents and agent-filled munitions and to produce incendiary munitions for use in World War II. Following the war and through the early 1980s, the facilities continued to be used by the Army. Beginning in 1946, some facilities were leased to private companies to manufacture industrial and agricultural chemicals. Shell Oil Company, the principal lessee, manufactured pesticides from 1952 to 1982 at the site. Common industrial and waste disposal practices during those years resulted in contamination of structures, soil, surface water, and groundwater.

There are two operable units (OUs) at RMA. The Off-Post OU addresses contamination north and northwest of RMA. The On-Post OU addresses contamination within the originally fenced 26.6 square miles of RMA. In January 2003, a 1.5-square-mile area of the On-Post OU along the western portion of RMA (the Western Tier Parcel) was determined to meet cleanup requirements and is no longer part of the National Priorities List (NPL) site. In January 2004, a second area of the On-Post OU measuring 7.9 square miles, predominantly in the southern portion but including areas around the entire perimeter of RMA (the Select Perimeter Area), was determined to meet cleanup requirements and is no longer part of the NPL site. Implementation of the remedy for the remaining approximately 17.2 square miles is ongoing and is scheduled for completion in 2011.

The contaminated areas within the On-Post OU include approximately 3,000 acres of soil, 15 groundwater plumes, and 798 structures. The most highly contaminated areas were identified in South Plants (the central processing area, Hex Pit, Buried M-1 Pits, and the chemical sewers), Basins A and F, Lime Basins, and the Complex (Army) and Shell Disposal Trenches. The primary contaminants found in soil and groundwater in these areas are organochlorine pesticides, solvents, metals, and the by-products of chemical warfare agent manufacturing.

The areas with the highest levels and/or the greatest variety of contaminants are located in the central manufacturing, transport, and waste disposal areas. The highest contaminant concentrations tend to occur in soil within five feet of the ground surface, although exceptions are noted, particularly where burial trenches, disposal basins, or manufacturing complexes are located.

The characteristics and locations of the groundwater plumes suggest that the greatest contaminant releases to the groundwater have occurred from Basin A, the Lime Basins, the South Plants chemical sewers, the South Plants tank farm and production area, the Complex (Army) Trenches and the Shell Disposal Trenches in Section 36, and former Basin F. Contaminant plumes also originate from other sources of contamination releases to groundwater in the Motor Pool/Rail Yard and the North Plants area.

The overall remedy required by the 1996 ROD for the On-Post OU includes the following:

- Intercept and treat contaminated groundwater.
- Construct a Resource Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA)-compliant Hazardous Waste Landfill (HWL) on-post.
- Demolish structures with no designated future use and dispose of the debris in either the new on-post HWL or the Basin A consolidation area, depending upon the degree of contamination.
- Contain contaminated soil in the on-post HWL, under caps/covers, or through treatment, depending upon the type and degree of contamination. Areas that have caps or covers require long-term maintenance and will be retained by the Army. Those areas will not become part of the future wildlife refuge.
- Establish institutional controls which prohibit use of the property for residential, agricultural, or industrial purposes; use of the groundwater or surface water as a source of potable water; consumption of fish or game taken at RMA; and that include access restrictions to capped or covered areas.

1.2 Elements of the Selected Remedy Requiring Long-Term Operation and Maintenance

Section 9.7 of the ROD requires long-term operations of remedial activities that will continue after the U.S. Environmental Protection Agency (EPA) releases most of the site for transfer to U.S. Fish and Wildlife Service (USFWS) as a wildlife refuge. Long-term operations and maintenance (O&M) include tasks such as:

- Inspection, maintenance, and monitoring of covers over contamination remaining in place, to ensure the integrity of the containment systems;
- Closure, maintenance, monitoring, and leachate collection and disposal for the HWL and the enhanced hazardous waste landfill (ELF), according to RCRA and TSCA requirements;
- Continued operation, maintenance, and monitoring of the groundwater treatment, extraction, and recharge systems to ensure they continue to function as intended;
- Maintenance of lake levels to cover contaminated sediment, and support aquatic ecosystems;
- Groundwater and surface water monitoring to evaluate the effectiveness of the remedy and maintenance of wells and other associated monitoring equipment;
- Access restrictions where necessary, and other institutional controls;
- Completion of five-year reviews to evaluate the effectiveness of the remedy.

1.3 The ROD Requirement for a Trust Fund

Because of the need for long-term O&M requirements at RMA, Section 9.4 of the ROD addressed the establishment of a Trust Fund that would help fund and therefore ensure proper long-term care of on-going remedial activities. The ROD states:

> *During the formulation and selection of the remedy, members of the public and some local governmental organizations expressed keen interest in the creation of a Trust Fund to help ensure the long-term operation and maintenance of the remedy once the remedial structures and systems are installed. In response to this interest, the Parties have committed to good-faith best efforts to establish a Trust Fund for the operation and maintenance of the remedy, including habitat and surficial soil. Such operation and maintenance activities will include those related to the new hazardous waste landfill; the slurry walls, caps, and soil and concrete covers; all existing groundwater pump-and-treat systems; the groundwater pump-and-treat system to intercept the Section 36 Bedrock Ridge Plume; the maintenance of lake levels or other means of hydraulic containment; all monitoring activities required for the remedy; design refinement for on-post Surficial soil as described in Section 9.4; and any revegetation and habitat restoration required as a result of remediation.*
>
> *These activities are estimated to cost approximately $5 million per year (in 1995 dollars). The principal and interest from the Trust Fund would be used to cover these costs throughout the lifetime of remedial program.*
>
> *The Parties recognize that establishment of such a Trust Fund may require legislation and that there are restrictions on the actions federal agencies can take with respect to proposing legislation and supporting proposed legislation. In addition to the legislative approach, the Parties are also examining possible options that may be adapted from trust funds involving federal funds that exist at other remediation sites. Because of the uncertainty of possible legislative requirements and other options, the precise terms of the Trust Fund cannot now be stated.*
>
> *A trust fund group will be formed to develop a strategy to establish the Trust Fund. The strategy group may include representatives of the parties (subject to restrictions on federal agency participation), local governments, affected communities, and other interested stakeholders, and will be convened within 90 days of the signing of the ROD.*
>
> *Notwithstanding these uncertainties, it is the intent of the Parties that if the Trust Fund is created it will include the following:*
>
> - *A clear statement that will contain the reasons for the creation of the Trust Fund and the purposes to be served by it.*
> - *A definite time for establishing and funding the Trust Fund, which the Parties believe could occur as early as 2008, when the remedial structures and systems may have been installed.*
> - *An appropriate means for competent and reliable management of the Trust Fund, including appropriate criteria for disbursements from the Trust Fund to ensure that the money will be properly used for the required purposes.*

1.4 Background of the Trust Fund Working Group

As required by the ROD, a work group was formed in August 1996 to develop a strategy for establishing a trust fund that would ensure funding for long-term O&M requirements once construction of the final remedy at RMA was completed.

The Trust Fund Work Group (sometimes referred to as the Trust Fund Committee or Subcommittee) met regularly from August 1996 to September 1999. Numerous options were explored over that period, and two primary trust fund options were developed by the Trust Fund Work Group — The "EPA Option," and the "Shell Option." Both of these options were presented to the Army.

The "EPA option" consisted of the establishment of a Trust Fund through EPA. The Army would enter into a memorandum of agreement (MOA) with EPA for EPA to establish an interest-bearing sub account within the Superfund Trust Fund. However, In May 1998, the Army issued a letter stating that this option was determined to be unacceptable, because the Army did not have authority to place monies it recovered from Shell into the Superfund Trust Fund. In addition, money in Superfund is not typically available for use at federally owned facilities. Additional discussion of the "EPA option" and the Army's opinion of this option is provided in Section 3.0.

The second, preferred option—the "Shell Option"—consisted of Shell Oil Company establishing a Trust Fund by placing money into a separate interest-bearing account, which would be managed by pre-selected trustees who would be bound to follow the trust terms for approving expenditures for the O&M activities. The Trust Fund Work Group spent almost three years developing this trust fund strategy but in May 1998 and again in August 1999, Mr. Raymond Fatz, the Deputy Assistant Secretary of the Army, indicated that the Shell Option was unacceptable and that the sole recourse left was to either establish a non-interest bearing account out of available monies, or to seek special legislation from Congress. The Army's opinion regarding the "Shell Option" was that proposal might violate the Miscellaneous Receipts Act, 31 United States Code (USC) 3302(b) because there must be a specific authorization from Congress to spend funds and any interest on appropriated money has to be paid into the General Treasury.

The Trust Fund Work Group worked until September 1999 to persuade the Army otherwise, but was unsuccessful. During this time, discussions were held with Representative Diana DeGette, Colorado First District, and members of her staff regarding pursuit of legislation to effect the trust fund. However, due to concerns raised by the Army and Shell that such efforts might result in the abolition or modification of the Shell settlement fund (known as the "Schroeder Account") if it was again brought to the attention of Congress, this option was not pursued. Local representatives of Commerce City supported the concerns of the Army and Shell, and at this point, further work on the Trust Fund came to an end.

2.0 THE TRUST FUND WORK GROUP

The Trust Fund Work Group was established in August 1996. Consistent with the ROD, initial participation included representatives of the Army, Shell Oil Company, EPA, the State of Colorado (including the Colorado Attorney General's Office, the Governor's Office, and the Colorado Department of Public Health and Environment (CDPHE)), Commerce City, Denver

Department of Environmental Health, the Restoration Advisory Board (RAB), the Site Specific Advisory Board (SSAB) and interested citizens. The group was co-chaired by Ms. Casey Shpall (Colorado Attorney General's Office), Commerce City Manager Tim Gagen, and former Commerce City Councilman and RAB member Mr. Roland Russell. Ms. Jane Feldman, Colorado Attorney General's Office, assumed Ms. Shpall's Trust Fund responsibilities in May 1998.

The following people participated in the Trust Fund Work Group:

Ed Benton
(Holme, Roberts and Owen), Attorney representing Shell Oil Company (Shell)

Kevin Blose
Program Controls Manager, Rocky Mountain Arsenal; for the Department of the Army

Garry Brewer
Department of the Army Attorney; representing the Program Manager, RMA

Jane Feldman - Trust Fund Work Group Co-Chair
Colorado Attorney General's Office

Tim Gagen - Trust Fund Work Group Co-Chair
Commerce City Manager

Sandra Jaquith
Representative from the SSAB and the RAB

Eugene J. Riordan
Special Counsel to Commerce City (Vranesh and Raisch, LLC), representing Northern Community Coalition

Rolland Russell - Trust Fund Work Group Co-Chair
Former Commerce City Councilman, representative of the RAB and the Northern Community Coalition

Casey Shpall - Trust Fund Work Group Co-Chair
Colorado Attorney General's Office

Waldo Smith
Representative from the RAB

The following people also participated in the Trust Fund Work Group, but were not considered to be part of the actual work group:

David Busby - Mayor of Commerce City

Wes Erickson - Department of the Army Attorney

Ronel Finley – USFWS, Biological Systems Manager

Larry Ford - South Adams County Water and Sanitation District

Beth Gallegos – RAB

Kerry Guy - EPA

Sandy Horrocks - RAB, SSAB, Chair Rocky Mountain Arsenal Subcommittee, Sierra Club

Tom Jackson - USFWS

Lee Kaley - Northern Airport Corridor Association, RAB

Dan Mulqueen - RAB, SSAB

Barbara Nabors - CDPHE

John Student - Denver Public Health/Environment Protection Division, RAB

Rick Warner - RAB, SSAB

Laura Williams - EPA

John Yelenick - RAB, SSAB

Doug Young - Governor's Office

The first meeting of the Trust Fund Work Group was held August 14, 1996 (meeting minutes from this meeting could not be located). The Trust Fund Work Group met approximately monthly until September 1999.

3.0 SUMMARY OF TRUST FUND WORK GROUP ACTIVITIES

The following is a chronological summary of the work conducted by the Trust Fund Work Group. This summary is based on available documentation such as meeting minutes and correspondence.

3.1 October 8, 1996

The Trust Fund Work Group initially developed eight options for establishing a trust fund. The agenda for the October 8, 1996 meeting (TFWG 1996) and the meeting minutes described the following eight options (Shpall 1996):

Option 1. Army requests direct appropriation from Congress to set up and finance an O&M trust fund.

Option 2. Shell and/or the Shell foundation directly contribute to the O&M trust fund.

Option 3. Use part of the corpus in Shell settlement fund (Schroeder account) to set up O&M trust fund.

Option 4. Use part of the corpus in the Shell settlement fund to set up interest-bearing O&M trust fund. Use the interest for O&M and ultimately return the corpus to the Shell settlement fund.

Option 5. State of Colorado makes direct contribution to assist in financing the O&M trust fund.

Option 6. Obtain and utilize natural resource damages money to assist in financing the O&M trust fund.

Option 7. Asset debenture - leverage land required to be transferred under the RMA Refuge Act by putting the property in trust and selling bonds.

Option 8. Citizen suit for monetary damages of injunctive relief to ensure O&M trust fund is set up and funded (enforcement of ROD provisions, diminution in property values, stigma, and environmental justice).

3.2 October 1996 through June 1997

These options for development of a trust fund were discussed in detail in subsequent meetings (Shpall 1996, 1997a, 1997b, 1997c, 1997d). In March and April 1997, after further consideration, the Trust Fund Work Group determined that there were two potentially viable options — the Shell Option, and the EPA Option. The Trust Fund Work Group also determined that involvement of the Army was critical and therefore decided to prepare a letter that described the Trust Fund Work Group and the proposals it developed for formation of a trust fund.

3.3 June 12, 1997

The Trust Fund Work Group sent a letter to Mr. Robert M. Walker, Assistant Secretary for Installations, Logistics and Environment, U.S. Department of the Army, at the Pentagon (TFWG 1997). The letter explains,

> *To date, our most difficult challenge has been the identification of a source of money for the actual funding of the trust fund. To be sure, a number of potential sources were evaluated including:*
>
> - *A separate appropriation from Congress;*
> - *A direct contribution from Shell Oil Company or the Shell Foundation;*
> - *A direct contribution from the state of Colorado;*
> - *Money that might be awarded in a natural resources damages lawsuit; and*
> - *Money that might be awarded in a citizen lawsuit claiming diminution of property values and environmental injustices.*

This letter continues to explain that the working group concluded it might not be possible to fully capitalize the trust fund at this time, but that it had identified an option for a source of initial funding. The letter explains that the option identified for the initial capitalization of the trust fund is direct funding by Shell and that the trust fund would be set up as an interest-bearing account. The Army would be allowed to draw on a portion of the principal and interest during the early years of the project for operation and maintenance of the existing remediation facilities such as the groundwater pump and treat systems. A certain amount of money would be left in the account so that at the end of the construction phase of the remedy, a reasonable amount of

money will have been generated for long-term O&M of the remediation facilities. The letter concludes by requesting the Army's review of and support for the proposal.

3.4 September 23, 1997

On September 23, 1997, Mr. Raymond Fatz, Deputy Assistant Secretary of the Army, in a letter addressed to Ms. Casey Shpall, Colorado Attorney General's Office, responded to the June 12, 1997 letter from the Trust Fund Working Group (Fatz 1997). In this letter, Mr. Fatz states that the Army is committed to creation of a Trust Fund, and ensuring immediate funding for the active cleanup has and will continue to be the primary focus of the Army. Mr. Fatz assigned Mr. Kevin Blose as an Army representative for the Trust Fund Working Group, and stated that his staff was currently considering the concept proposed along with possible refinements and alternatives. Mr. Fatz committed to share the Army's strategies with the Trust Fund Working Group no later than October 20, 1997.

3.5 December 9, 1997

A Fact Sheet dated December 9, 1997 and entitled "Trust Fund Status" was prepared to brief Mr. Fatz on the status of the Trust Fund Work Group (Shpall 1998b). The Fact Sheet addressed establishment of a Trust Fund utilizing an EPA account within Superfund or through legislation authorization. The following summarizes the information included within the Fact Sheet:

Two mechanisms were described for establishing an interest-bearing trust fund:

1. Utilization of an EPA account within Superfund. The Fact Sheet explains that legislative authorization already exists under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for potentially responsible parties (PRPs) depositing funds to be used exclusively for MOA-specified site-specific use. This option would utilize EPA's current sub-accounts under Superfund and would be discussed further between EPA and the Army in January 1998.
2. Seeking legislative authorization. The Fact Sheet states that this is a fallback position for the Trust Fund Work Group and explains that the Army cannot actively lobby Congress for legislative relief.

The Fact sheet also lists possible sources of funds that had been identified by the Trust Fund Work Group:

• Special Account "hold back"	$5 M
• South Adams County Water and Sanitation District (SACWSD) Henderson contingency	$1 M
• SACWSD Colorado Local Government Liquid Asset Trust (COLOTRUST) interest	$1 M (estimate)
• Scott's Liquid Gold payments	$2 M - $6 M (depending on remediation)
• Eureka Lab payments	$0.065 M
• Chem Sales payments	$0 (none available)
• Klein O&M Fund	$0 (probably none available)
• Shell contribution	$5 M

The Fact Sheet indicates that all sources except the Shell contribution would require a fiscal law determination on whether those funds could be withdrawn from the Special Account for use in the Trust Fund. This alternative was not considered likely, unless a legislatively authorized EPA Superfund sub-account could make this possible.

The Fact Sheet explains that the use of a special Shell contribution would require these funds to be considered a response cost so Shell can obtain allocability credit.

In addition, on December 9, 1997, a Trust Fund Work Group meeting was held. In this meeting the group discussed the possibility of the Army entering into an MOA with EPA for a site-specific superfund account, called a special account. This option was proposed by Mr. Blose. It was agreed that Mr. Blose should meet with the EPA, begin drafting an MOA, and report back to the group (Shpall 1998).

3.6 January 7, 1998

A Trust Fund Work Group meeting was held that focused on establishing a trust fund through an Administrative Order, signed by EPA, the Army, and Shell (TFWG 1998a). EPA would manage the fund as a special account set up under CERCLA 122(b)(3). Although special accounts set up in this manner are used by EPA to manage private funds for response actions and not necessarily O&M, this appeared to be the best mechanism for developing a trust fund managed by EPA. Kelcy Land with EPA explained that an agreement would be necessary documenting that EPA would manage the fund through a special account that would reside in the Superfund Trust Fund and earn interest. A Settlement of Administrative Order would be prepared including EPA, the Army, and Shell as signatories. An Interagency Agreement would be developed which would facilitate transferring the Trust Fund money from the EPA to the Army as needed (TFWG 1998a).

3.7 February 10, 1998

From the eight options originally developed, the Trust Fund Work Group selected two options that seemed the most feasible. These two options are summarized in the memorandum to Rick Newsome, assistant to Mr. Raymond Fatz, dated February 10, 1998, by Kevin Blose, Program Controls Manager, Department of the Army, regarding the Trust Fund (Blose 1998). This memorandum states that the Army, Shell, and the Trust Fund Work Group would continue to explore options, but these two options offer the best opportunity for establishing the Trust Fund. The memorandum describes the two selected options as follows:

1. Shell Pre-Payment Option: An interest-bearing Trust Fund would be established directly as an RMA response action project. Shell would, at the Army's request, accept lead party status for a portion of this response action, and would establish the Trust Fund with an initial capitalization of $5 million. In return, Shell would receive credit for this expenditure against the periodic payments due under the Settlement Agreement and the Federal Facilities Agreement. This option would require a determination at the Department of the Army (DA) level that the Trust Fund is a response cost for which Shell could receive allocable credit, and that there is no statutory or regulatory prohibition against the monies going into a trust fund outside the federal government.
2. Establishment of the Trust Fund through EPA: The Army would enter into a memorandum of agreement with EPA for EPA to establish an interest-bearing sub account for RMA within the Superfund Trust Fund. In a legal memorandum from EPA (May 6, 1993) EPA states that CERCLA §122(b)(3) authorizes it to establish interest-

bearing sub accounts at various Superfund sites. Monies paid by PRPs at these sites are deposited into the specific site sub account, the proceeds of which are to be used for purposes of implementing the remedy at that site. In a series of letters between EPA and the Office of Management and Budget (OMB), OMB concurred with EPA's interpretation of its CERCLA authority. Under this scenario, the Army would fund the EPA account with monies from its litigation settlements (with Shell Oil, Scott's Liquid Gold, etc.), which would normally be deposited into the Schroeder Account. This option would need to be determined acceptable to EPA Region 8 and the DA (i.e., the DA would need to determine that RMA can enter into this type of settlement agreement and deposit funds into the sub account).

This memorandum concludes that the principal in the Trust Fund, under either of these two options, would be available to the Army for remediation and the interest would be earmarked for O&M.

3.8 May 29, 1998

On May 29, 1998 a memorandum was sent from Mr. Raymond Fatz to the Program Manager for RMA. The memorandum is a response to the February 10, 1998 memorandum and provides the Army's review of the two proposed options. The memorandum concludes that both options are unacceptable for the reasons described below (Fatz 1998):

- The first option is unacceptable because monies deposited by Shell into the RMA special account are considered response costs. The memorandum explains that response costs must be managed under the same rules that apply to appropriated funds, and therefore the money received as response costs may not be placed into an interest-bearing account.
- The second option is unacceptable because there is no authority for the Army to place monies it recovers from Shell into the Superfund Trust Fund. The Superfund is authorized to receive "amounts recovered on behalf of the Superfund under ...CERCLA." This allows the EPA to put payments from PRP settlements under CERCLA 122(b)(3) into the fund because the recoveries are made on behalf of the Superfund. Army money recovered from Shell could not be placed into the Superfund because the recovery is not on behalf of the Superfund. CERCLA 111(e)(3) provides that, with certain very limited exceptions, no money in the Superfund is available for remedial action at federally owned facilities.

The memorandum indicates that there is a remaining option that does not involve legislation – to set aside some level of funding that is already available or to be paid by Shell into the special account and designate it as the Trust Fund. However, this could not be an interest bearing account.

This memorandum also states that RMA receives more restoration funds than any other Army installation, so it is a prime candidate for cost avoidance.

3.9 July 21, 1998

A memorandum from Colonel Eugene Bishop, Program Manager, was sent to Mr. Raymond Fatz. This memorandum was a response to the May 29, 1998 memorandum from Mr. Fatz stating that the two options identified by the Trust Fund Work Group were not acceptable, and evaluates a third option that was proposed by Mr. Fatz: "... setting aside of some level of funding in the Special Account and designating it as the RMA Trust Fund" (Bishop 1998).

This memorandum states that the third option is not feasible or practicable because it may result in making funds that were previously set-aside as Special Account monies unavailable at key stages of the cleanup. This may deny the program the ability to maximize time and money during remedy execution. Therefore, the only available option appears to be special legislation authorizing the establishment of an interest-bearing account. Proposing such legislation rests with the community, not the Army, and therefore, no additional action is necessary by the Army for the Trust Fund (Bishop 1998).

3.10 September 16, 1998

In a meeting on September 16, 1998, the Trust Fund Work Group agreed to continue the effort to develop proposals for a Trust Fund despite the May 29 and July 21, 1998 memorandums from the Army. It was agreed that Gene Riordan and Jane Feldman would review details of the Army's rejection of the proposed options, to aid in developing a strategy to use in responding back to the Army (Gagen 1998).

A supporting document (referred to as the "Analysis" of Option 1 and Option 2) explaining the opinion from Mr. Fatz's office regarding the two Trust Fund options presented by the Trust Fund Group was provided by Garry Brewer to the Trust Fund Work Group in the September 16, 1998 meeting, and to Jane Feldman on September 17, 1998. There is no author indicated on the Analysis write-up; however, the transmittal (fax cover sheet) from Garry Brewer to Jane Feldman explains that the two Trust Fund options were rejected at the DA level (Brewer 1998).

3.11 October 27, 1998

In a meeting on October 27, 1998, the Trust Fund Work Group decided to respond to the Army's concerns regarding the Shell Option, although Shell declined to participate in drafting the letter. Jane Feldman reported that she had talked to staff members from Senator Allard's office, and Representatives Schaefer's and DeGette's offices, about the possibility of legislation in the event the Army would not agree to any of the Work Group's proposed options (Feldman 1999a).

3.12 November 3, 1998

On November 3, 1998, the Trust Fund Work Group prepared a letter to Mr. Raymond Fatz. This letter was a response to the May 29, 1998 memorandum and more fully explains the Trust Fund Work Group's preferred alternative and addresses the Army's belief that the proposal violates the Miscellaneous Receipts Act, 31 USC § 3302(b) (TFWG 1998b). The letter explains the following points:

1. Shell is liable for a certain percentage of the Arsenal response costs and has accepted lead party status for certain response actions in the past. In these cases, Shell has received credit for the costs incurred against the allocable costs due under the Settlement Agreement and the Federal Facilities Agreement (FFA) (e.g., implementation of the Submerged Quench Incinerator (SQI)). The Trust Fund Work Group used this same approach in selecting its preferred alternative for the initial capitalization of the ROD-specified Trust Fund.
2. The letter explains more fully the Trust Fund Work Group's preferred alternative:
   - Shell does not make payment to the Army, either directly or indirectly, of its share of allocable costs.

- Shell directly undertakes a ROD-specified response action (i.e. establishment of a Trust Fund) as it did with the SQI.
- Shell would receive credit for the cost it incurs in implementing that response action, against its share of the allocable costs.
- There is never any "recovery of money by the Army."
- The money Shell uses to initially capitalize the Trust Fund would not be available to the Army for environmental cleanup at RMA.
- Decision on how to spend the Trust Fund money would be made solely by the Trustees.
- The revised proposal does not allow the Army to draw on a portion of the principal and interest during the early years of a project construction for O&M of existing remediation facilities (as originally proposed). This is not required by the ROD, and this mechanism violates the Miscellaneous Receipts Act.
- The Trustees would control the money held in trust pursuant to a Trust Agreement. If and when the trust funds were needed, the Trustees could either fund a private party or provide the money directly to the Army if the Army had obtained the necessary appropriation of authorization from Congress to receive the funds.

3. The letter concludes with a request for a meeting with the Army either in Denver or in Washington D.C. (TFWG 1998b).

3.13 January 20, 1999

In a Trust Fund Work Group meeting on January 2, 1999, Mr. Garry Brewer reported that he had received a message from Mr. Robert Davenport from the Army Office of General Counsel, that the Army would like to schedule a meeting in Washington D.C. with representatives from the Trust Fund Work Group (Feldman 1999).

3.14 February 23, 1999 and March 9, 1999

Representatives of the Trust Fund Work Group (Jane Feldman, Roland Russell, Sandra Jaquith, David Busby, Gene Riordan, Ed Benson, and Garry Brewer) went to Washington, D.C. to meet with Mr. Raymond Fatz, Deputy Assistant Secretary of the Army, and Rick Newsome, from the Army Office of General Counsel and Army fiscal law attorneys. The January 20, 1999, Trust Fund Meeting Minutes include a discussion of this trip.

The Trust Fund Work Group also met with Mr. Raymond Fatz again in Denver, Colorado on March 9, 1999, following the Steering and Policy Committee meeting (Nabors 2005).

3.15 May 27, 1999

The Trust Fund Work Group prepared a letter to Mr. Raymond Fatz to address three issues that arose during the meetings in Washington and Denver in February and March 1999. The letter is actually dated May 27, 1998 but this appears to be a typographical error because the letter references meetings that were held in 1999 in Washington. The option presented in this letter was referred to as the "Modified Shell Option" (TFWG 1999).

The letter included a summary of the proposal by the Trust Fund Work Group—the "Modified Shell Option" — as described below:

- Shell Oil Company would accept lead party status for the initial capitalization of the $5 million Trust Fund.
- Shell would then receive credit for the Trust Fund expenditure against its allocable costs.
- The fund would be managed by a group of trustees for the purpose of long-term O&M and RMA.
- Shell would not make any direct payments to the Army and the trustees would have the sole authority to approve expenditures from the Fund.
- When expenditure became necessary, the trustees could either fund a private party or provide the money directly to the Army.

The letter addressed the three issues with the "Modified Shell Option" that were raised by the Army in the February and March 1999 meetings in Washington D.C.

1. <u>"Whether the Schroeder Account enabling legislation requires that all money relating to RMA cost recovery must be deposited therein."</u>

   Mr. Matt Reres, Army Deputy Legal Counsel for Ethics and Fiscal Issues, was concerned that the provision of money by Shell as capital for a trust account would violate the law (Section 1367 of Public Law 99-691) which permits the Army to deposit money derived from RMA cost recovery litigation into the Schroeder Account.

   - The Trust Fund Work Group responded that this was not a concern because the Shell money deposited into the Trust Fund would never be received by the United States. Shell is not paying money to the Army.
   - Only money actually received must be placed in the Schroeder Account. Subsection (b) of the legislation authorizes the United States to accept services in lieu of money at RMA.
   - For the SQI project, Shell was the lead party and paid for the project, but the money for the project did not have to be routed through the Schroeder Account.

2. <u>"Whether there is positive authority for the Modified Shell Option."</u>

   Mr. Matt Reres believed there must be a "positive legislative authority" for the Modified Shell Option.

   - The Trust Fund Work Group responded as follows:

     The Trust Fund committee believes that the Schroeder Account legislation provides this legislation authority because it authorizes the Army to accept "services that correct the effects of contamination" in lieu of money at RMA. Through establishment of the Trust Fund, Shell would be performing such a service. The purpose of the Trust Fund would be to ensure that long-term operations and maintenance can be conducted at RMA, clearly a function that not only corrects the effects of contamination but is also a ROD-specified part of the remedy at RMA. Therefore, the Schroeder Account legislation provides the necessary positive

authorization for the creation of the RMA Trust Fund.

3. "Whether the reference to special legislation in the ROD creates a requirement for special legislation."

   The ROD states, "... the Parties recognize that establishment of . . . a Trust Fund may require special legislation and that there are restrictions on the actions federal agencies can take with respect to proposing legislation and supporting proposed legislation." The Army's concern was that this statement represents an expression of a requirement, or at least a preference, for special legislation to establish the Trust Fund.

   - The Trust Fund Committee responded that:

     This ROD language does not express a requirement for special legislation, nor does it indicate a "preference" for such an approach. At the time the ROD was signed, there was uncertainty of possible legislative requirements or other options that may be needed to establish the Trust Fund.

This letter concluded by requesting a response from the Army on the "Modified Shell Option."

3.16 August 3, 1999

Mr. Raymond Fatz responded to the May 27, 1999, letter from the Trust Fund Work Group (Fatz 1999). Mr. Fatz's response letter states that the Department of the Army appreciated the diligent efforts put forth by the Trust Fund Work Group and would continue to review alternative approaches that the Work Group presents. The letter also states, "Although you have proposed an innovative approach for establishing the Trust Fund, there are strict legal limitations that the proposal does not overcome." This letter concludes that the information provided by the Trust Fund Work Group in the May 27, 1999 letter was considered "legally deficient." The following is a summary of details explaining why the information provided by the Trust Fund Work Group in the May 27, 1999 was considered legally deficient:

One of the fundamental tenets of federal fiscal law is that Congress has the exclusive power to authorize the expenditure and receipt of public monies by federal agencies. In accordance with the Miscellaneous Receipts Act, funds received by an agency must be deposited into the United States Treasury as soon as practicable. 31 USC 3302 (b). The statue prohibits an agency from augmenting its appropriations from outside sources without specific statutory authority. If Congress has authorized an agency to receive funds, other than those appropriated to it, the money must be deposited and used in strict accordance with that congressional authorization. The receipt of funds under the Miscellaneous Receipts Act applies to both funds actually received by the Federal Government as well as funds constructively received. The Miscellaneous Receipts Act applies if an agency could have accepted possession of funds, but did not, and still maintain the right to direct the use of the money. Actual receipt of the funds by the federal agency is not required for the Act to apply. "The doctrine of constructive receipt will ignore the form of a transaction in order to get to its substance," 4B U.S. Op. OLC. 684, 687.

The Army recognizes that PL 99-661 § 1367(b) allows for the Army to accept services to correct the effects of contamination at RMA. The capitalization of a Trust Fund with money that should be deposited into the Schroeder Account pursuant to federal law, however, it not the type of service envisioned by the

statute. Subsection (b) merely recognizes the Army's lead agency status for the cleanup at RMA and the discretion that the Army has under CERCLA to enter into an agreement with another potentially responsible party at a site to perform a portion of the remedial action. Money paid by Shell for its portion of allocable costs at the site, although not directly paid to the Army, would constitute a constructive receipt of funds; therefore, the diversion of these funds into an account outside of the U.S. Treasury would violate the Miscellaneous Receipts Act.

3.17 August 13, 1999

Jane Feldman reported on a briefing with Representative Diana DeGette, regarding the legislative option. Representative DeGette expressed an interest in sponsoring legislation. The Work Group discussed plans to also contact the offices of Senator Wayne Allard, Senator Ben Nighthorse Campbell, and Representative Mark Udall (Feldman 1999b). Meetings with elected officials were not held with the full Trust Fund Work Group, but individual members of the Work Group made additional contacts. For example, Jane Feldman talked with staff from Senator Campbell's office, and with staff members from Representatives DeGette's, Schaefer's, and Udall's offices (Nabors 2005).

In the August 13, 1999 meeting, the Trust Fund Work Group also discussed preparation of a response letter to Mr. Raymond Fatz (Feldman 1999b).

3.18 September 1, 1999

The Trust Fund Work Group discussed the August 3, 1999 letter, which indicated that the only remaining option was to seek appropriate legislation. Gene Riordan with Commerce City indicated that Commerce City did not support pursuing the legislative option, given concerns about losing the flexibility of the Schroeder Account. Shell Oil Company and the Army had earlier expressed concerns that such efforts might lead to Congress abolishing or otherwise modifying the Schroeder Account if it was again brought to the attention of Congress (see minutes of the Trust Fund Work Group meetings on October 8, 1996; January 10, 1997; January 23, 1997; and April 13, 1999). Following this meeting, no further meetings were scheduled.

4.0 SUMMARY OF THE WORK OF THE TRUST FUND WORK GROUP

The ROD identified the remedy to be implemented for the RMA site. After the construction phase of the remedy, continued remedial activities (e.g., pumping and treating of groundwater), continued maintenance of structures designed to isolate and prevent the escape of hazardous waste at the site (e.g., soil covers and landfills), and continued monitoring (e.g., of groundwater and surface water) are required. These activities fall under the long-term O&M portion of the remedy and were estimated to cost approximately $5 million per year in 1995 dollars.

During the development of the ROD, members of the public and some local governmental organizations expressed keen interest in the creation of a trust fund to help ensure that the long-term O&M obligations of the Army would be performed. This provision was included because, at the time of the ROD, there was concern that Congress would severely cut funding for the clean up of RMA, leaving the remedy incomplete. The ROD provided for the formation of a trust fund group to develop a strategy to establish such a trust fund. A Trust Fund Work Group was

established in August 1996 and numerous options were explored over the next year.

Two primary options were presented to Mr. Raymond Fatz, Deputy Assistant Secretary of the Army, in a letter dated June 12, 1997. One of the two options, the "EPA option," later proved to be unworkable. The second preferred option, the "Shell Option", consisted of a request by the Army for Shell Oil Company to accept lead party status for the Trust Fund. Shell would then establish the Trust Fund, placing the money in a separate interest-bearing account. This account would be managed by pre-selected Trustees, who would be bound, pursuant to the ROD, to follow the criteria in a stand-alone Trust Agreement for approving expenditures on the O&M of the remedy. The Trustees would have sole authority to approve expenditures from the Trust Fund. When expenditures became necessary, the Trustees could either fund a private party (such as an environmental contractor) to do the work or could provide the money directly to the Army. Shell would receive "credit" for the payment as an allocable cost under the 1988 Army-Shell Settlement Agreement that details the cost sharing agreement between those parties.

All payments by Shell under the Settlement Agreement with the Army are currently deposited into the so-called "Schroeder Account," a special non-interest bearing account set up by Congress in 1986 to allow the Army to spend the funds deposited by Shell without a separate Congressional appropriation. This account is of great benefit to activities at RMA, because major projects can be accomplished without waiting for Congressional appropriation.

In May 1998, Mr. Raymond Fatz, Deputy Assistant Secretary of the Army, stated that neither option was acceptable, and that the sole recourse left was to either establish a non-interest bearing account out of available monies, or to seek special legislation from Congress. The basis for this position was that the proposal might violate the Miscellaneous Receipts Act, 31 USC 3302(b), because there must be a specific authorization from Congress to spend funds, and any interest on appropriated money has to be paid into the General Treasury. The Trust Fund Work Group worked until September 1999 to persuade the Army otherwise, but without success.

The last remaining option considered by the Trust Fund Working Group was to seek legislation to modify the Schroeder Account to fund the O&M trust account. During this time, meetings were held with Representative Diana DeGette and members of her staff regarding pursuit of legislation to effect the Trust Fund. This option was not pursued, however, due to concerns by the Army and Shell that such efforts might lead Congress to abolish or otherwise modify the Schroeder Account, if it was again brought to the attention of Congress. This view was also supported by Commerce City representatives.

At this point, all further work on the Trust Fund ended. Based upon the activities conducted as described above, the Parties believe that they have exercised their good-faith best efforts to establish a Trust Fund for the operation and maintenance of the remedy, including habitat and surficial soil, as outlined in Section 9.4 of the ROD. No additional efforts to attempt the establishment of a Trust Fund are planned.

REFERENCES

Bishop, Colonel Eugene H., Program Manager, Rocky Mountain Arsenal. 1998. Memorandum for Mr. Raymond Fatz, Deputy Assistant Secretary of the Army regarding the Rocky Mountain Arsenal Trust Fund. July 21.

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

June 8, 2006

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Ms. Newton:

Enclosed is the Final Explanation of Significant Differences for the Section 36 Bedrock Ridge Groundwater Plume Extraction System Rocky Mountain Arsenal Federal Facility Site.

Copies of this letter were forwarded to:

a. Mr. M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal (DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748 (w/encl).

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203 (w/encl).

c. Mr. Brad Coleman, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite G228, Englewood, Colorado 80112 (w/encl 2 copies).

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037 (w/encl).

e. Mr. Mark Thomson, Washington Group, P.O. Box 1717, Commerce City, Colorado 80022 (w/o encl).

f. Mr. Daniel J. Dunn, Holme Roberts and Owens, 1700 Lincoln Street, Suite 4100, Denver, Colorado 80203 (w/encl).

g. Mr. Tom Jackson, U.S. Fish and Wildlife Service, Rocky Mountain Arsenal, Commerce City, Colorado 80022-1748 (w/encl).

h. Mr. Dan Collins, Tri-County Department Environmental Health Division, 4201 East 72nd Avenue, Commerce City, Colorado 80222-1488 (w/encl).

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EXPLANATION OF SIGNIFICANT DIFFERENCES FOR THE SECTION 36 BEDROCK RIDGE GROUNDWATER PLUME EXTRACTION SYSTEM ROCKY MOUNTAIN ARSENAL FEDERAL FACILITY SITE

Prepared by:
Washington Group International, Inc.

Prepared for:
Rocky Mountain Arsenal Committee
Department of the Army
Shell Oil Company
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

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CONTENTS

ACRONYMS AND ABBREVIATIONS

BANCS	Basin A Neck Containment System
CBSG	Colorado Basic Standards for Groundwater
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
DAA	Detailed Analysis of Alternatives Report
EPA	U. S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FWENC	Foster Wheeler Environmental Corporation
HWL	Hazardous Waste Landfill
IRA	Interim Response Action
JARDF	Joint Administrative Record Document Facility
NBCS	North Boundary Containment System
NCP	National Contingency Plan
NPL	National Priorities List
OU	Operable Unit
RAB	Restoration Advisory Board
RI	Remedial Investigation
RMA	Rocky Mountain Arsenal
ROD	Record of Decision
TCHD	Tri-County Health Department

1.0 INTRODUCTION

This Explanation of Significant Differences (ESD) documents a significant change in a portion of the remedy for groundwater contamination at the Rocky Mountain Arsenal (RMA) Federal Facility Site. The RMA On-Post Operable Unit (OU) is a federally owned facility located in southern Adams County, Colorado, approximately 10 miles northeast of downtown Denver, directly north of the former Stapleton International Airport and west of Denver International Airport (Figure 1). The RMA On-Post OU site encompasses 17.2 square miles and is currently on the U.S. Environmental Protection Agency (EPA) National Priorities List (NPL) for environmental cleanup as a result of contamination released during previous RMA operations. The groundwater remedy addresses contaminated groundwater located throughout the On-Post OU.

The Record of Decision (ROD), which describes the remedy for the entire On-Post OU of RMA, was signed by the U.S. Army, the EPA, and the state of Colorado on June 11, 1996 (FWENC 1996). The selected remedy includes 31 cleanup projects for soil, structures, and treatment of groundwater contamination (PMRMA 2004). As the site-wide remediation is completed, most of the On-Post OU of RMA will become a National Wildlife Refuge, as provided for in Public Law #102-402.

The Army is the lead agency for RMA and is issuing this ESD as part of its responsibilities under Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986, and pursuant to the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Section 300.435(c)(2)(i). The NCP requires an ESD when the remedial action taken differs significantly from the remedy selected in the ROD with respect to scope, performance or cost. Regulatory oversight is conducted by the EPA, Colorado Department of Public Health and Environment (CDPHE), and the Tri-County Health Department (TCHD). The TCHD oversees local public health and environmental issues in Adams, Arapahoe, and Douglas Counties.

The ROD groundwater remedy consists primarily of extraction and treatment of contaminated groundwater through continued operation of existing boundary and on-site treatment systems. In addition, there are limited areas of extraction and treatment of contaminated groundwater to mitigate contaminant sources, such as Section 36 Bedrock Ridge, North of Basin F and Complex Army Trenches.

The original intercept system alternative in the Detailed Analysis of Alternatives Report (DAA) (FWENC 1995) proposed drilling and installing a 1400-foot long horizontal well under the bedrock ridge. Later studies indicated that the plume was narrow thus there was no need for a 1400-foot long horizontal well, and the nature of the aquifer was adequate for a less expensive vertical well extraction system. The modified design for the extraction system consisted of three 8-inch extraction wells to capture the plume. A fourth extraction well was added in 2005 to maintain plume capture. The change in well configuration resulted in a 66 percent decrease in project cost compared to the ROD-estimated cost. These changes, while resulting in the need for an ESD, do not alter the overall groundwater remedy that was selected in the ROD.

This ESD will become part of the Administrative Record as required by the NCP, 40 CFR 300.825(a)(2) (EPA 1990). The Administrative Record is available to the public at the Joint Administrative Record Document Facility (JARDF), located on the RMA in Building 129, Room 2024. The JARDF is open Monday through Friday between Noon and 4 pm or by appointment. The telephone number for the JARDF is 303-289-0362.

2.0 SITE HISTORY, CONTAMINATION AND SELECTED REMEDY

2.1 RMA Operational History

The RMA was established in 1942 by the Army to manufacture chemical warfare agents and agent-filled munitions and to produce incendiary munitions for use in World War II. Following the war and through the early 1980s, the facilities continued to be used by the Army. Beginning in 1946, some facilities were leased to private companies to manufacture industrial and agricultural chemicals. Shell Oil Company, the principal lessee, manufactured pesticides from 1952 to 1982 at the site. Common industrial and waste disposal practices during those years resulted in contamination of structures, soil, surface water, and groundwater.

The On-Post OU is one of two operable units at RMA. The Off-Post OU primarily addresses groundwater contamination north and northwest of RMA. The On-Post OU addresses contamination within the approximately 27 square miles of RMA. As of January 2004, 9.4 square miles of the On-Post OU have been determined to meet cleanup requirements and are no longer part of the NPL site. Implementation of the remedy for the remaining 17.2 square miles is ongoing and is scheduled for completion in 2011.

The contaminated areas within the On-Post OU included approximately 3,000 acres of soil, 15 groundwater plumes, and 798 structures. The most highly contaminated areas were identified in South Plants (the central processing area, Hex Pit, Buried M-1 Pits, and the chemical sewers), Basins A and F, the Lime Basins, and the Complex (Army) and Shell Trenches. The primary contaminants found in soil and groundwater in these areas are organochlorine pesticides, solvents, metals, and chemical warfare agent by-products.

The areas with the highest levels and/or the greatest variety of contaminants are located in the central manufacturing, transport, and waste disposal areas. The highest contaminant concentrations tend to occur in soil within five feet of the ground surface, although exceptions are noted, particularly where burial trenches, disposal basins, or manufacturing complexes were located.

The characteristics and locations of the groundwater plumes suggest that the greatest contaminant releases to the groundwater have occurred from Basin A and the Lime Basins, the South Plants chemical sewer, the South Plants tank farm and production area, the Complex (Army) and Shell trenches in Section 36, and the former Basin F. The Motor Pool/Rail Yard and North Plants areas have been other sources of contaminant releases to the groundwater.

2.2 Site Description

The Bedrock Ridge area is located along a topographic high (up to 5,260 ft) in the northeast corner of Section 36. The ridge separates the Basin A area from the First Creek drainage. The

Basin A area is located southwest of the Bedrock Ridge with a low point elevation of about 5,232 ft and the First Creek drainage is located to the northeast of the Bedrock Ridge with a low point elevation of about 5,216 ft. Data from previous investigations conducted between December 1997 and April 1998 identified the contaminated groundwater plume emanating from the Bedrock Ridge toward First Creek and provided geologic data for construction of the system. The system was designed to intercept and contain the contaminated groundwater plume.

2.3 Summary of the Selected On-Post Remedy

The overall remedy required by the 1996 ROD for the On-Post OU includes the following:

- Interception and treatment of contaminated groundwater at the three existing on-site treatment plants
- Construction of a new RCRA- and Toxic Substances Control Act-compliant hazardous waste landfill (HWL) on-post
- Demolition of structures with no designated future use and disposal of the debris in either the new, on-post HWL or the Basin A consolidation area, depending upon the degree of contamination
- The contaminated soil at RMA is addressed primarily through containment in the on-post HWL or under caps/covers, or through treatment depending upon the type and degree of contamination. Areas that have caps or covers require long-term maintenance and will be retained by the Army. These areas will not become part of the wildlife refuge.
- The Basin A disposal area is used for consolidation of biota risk soil and structural debris from other RMA contamination areas and is covered with a soil cover including a biota barrier.

2.4 Summary of the Selected Remedy for Groundwater Related to this ESD

The ROD identifies the following major remedial action for groundwater relevant to this ESD:

- A new extraction system will be installed in the Section 36 Bedrock Ridge area. Extracted water will be piped to the Basin A Neck system for treatment (e.g., by air stripping or carbon absorption).

Remedial action objectives developed for the Bedrock Ridge project, based on the ROD language, are as follows:

- Intercept and contain a contaminated groundwater plume in the northeast corner of Section 36;
- Treat the extracted groundwater with appropriate processes to ensure compliance with the CSRGs established for the system.

3.0 BASIS FOR THE ESD

The ROD estimated cost for the project was $3.63 million. The original cost of the system was based on the design, drilling, and installation of a 1400 foot horizontal well under the Bedrock Ridge. The extraction system was redesigned to include drilling and installing three vertical

extraction wells to capture the plume. A fourth well was added to maintain capture of the contaminant plume and fulfill the ROD requirements.

The actual cost of the project was $1.2 million. The cost reduction of $2.43 million (66%) from the ROD estimated cost is the basis of this ESD.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES

The following sections summarize the changes to the ROD-identified groundwater remedy and discuss the cost impact of the revised remedy. The changes described do not alter the groundwater remedy selected in the ROD and the remedy remains protective of human health and the environment.

4.1 Changes to Remedy

The original intercept system selected alternative in the Detailed Analysis of Alternatives Report (FWENC 1995) proposed drilling and installing a 1400-foot long horizontal well under the bedrock ridge. The modified design of the intercept system outlined in the 100% Design Package for the Bedrock Ridge Extraction System (Morrison Knudsen 1999) consists of three 8-inch extraction wells. The extraction wells were drilled and installed between July 1999 and February 2000. It was determined that extraction well DW-2 was unable to yield sufficient flow to maintain capture. In order to maintain capture, a fourth extraction well was drilled and installed in November 2004.

4.2 Summary of Cost Change

The ROD baseline estimated cost for implementation of the selected Detailed Analysis of Alternatives groundwater remedy was $3.63 million, which includes design and, remediation costs. The baseline estimate represents original ROD estimated costs reorganized to reflect implementation project descriptions in the Remediation Design and Implementation Schedule (PMRMA 2004). The design and construction of the Bedrock Ridge Extraction system resulted in a cost decrease compared to the ROD-estimated cost. The actual total cost of the design, drilling, well installation, and conveyance piping for the four well groundwater extraction system was $1.2 million. This represents a 66% decrease from the ROD estimated cost.

5.0 SUPPORT AGENCY COMMENTS

The EPA, CDPHE, and TCHD have reviewed this ESD. Comments from these Agencies have been incorporated into the final document.

6.0 PUBLIC PARTICIPATION COMPLIANCE

The Army published a public notice in the Rocky Mountain News and Denver Post on March 14, 2006, making this draft ESD available for public review and comment. Notices were also published in the Commerce City Beacon, Brighton Blade and Far NE Reporter. A presentation explaining the proposed changes contained in the ESD will be provided to the RMA Restoration Advisory Board (RAB) on March 30, 2006. The RAB is a community group that meets periodically to receive information and provide input on the cleanup being conducted at the RMA. The public comment period will close on April 14, 2006. The requirements set out in the NCP, Section 300.435(c)(2)(ii), have been met.

This ESD and all documents that support the changes and clarifications are part of the Administrative Record and are available at the JARDF and the EPA Region 8 Superfund Record Center. The JARDF is open Monday through Friday between Noon and 4 pm or by appointment. The telephone number for the JARDF is 303-289-0362. The EPA Superfund Record Center can be reached at 303-312-6473. Hours of operation are Monday through Friday from 8 a.m. to 4:30 p.m.

7.0 STATUTORY DETERMINATIONS

Considering the new information presented in this ESD, the Army, in consultation with EPA and CDPHE, believes that the groundwater remedy, with the modifications described, satisfies the requirements of CERCLA Section 121 and is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, uses a permanent solution through extraction and treatment of contaminated groundwater, and is cost effective.

Signatures

For U.S. Environmental Protection Agency

Date 5.4.06

Terry L. Anderson
Director, Federal Facilities Program

For U.S. Army

Date 5/1/06

Charles T. Scharmann
Program Manager for Rocky Mountain Arsenal

For State of Colorado

Date 5/4/06

Gary W. Baughman
Director, Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

8.0 REFERENCES

Ebasco (Ebasco Services Incorporated), January 1992. Remedial Investigation Summary Report, Version 3.2.

EPA (U.S. Environmental Protection Agency), 1990. National Oil and Hazardous Substances Pollution Contingency Plan. Final Rule. 40 CFR Part 300. Federal Register 55 (46): 8666-8865.

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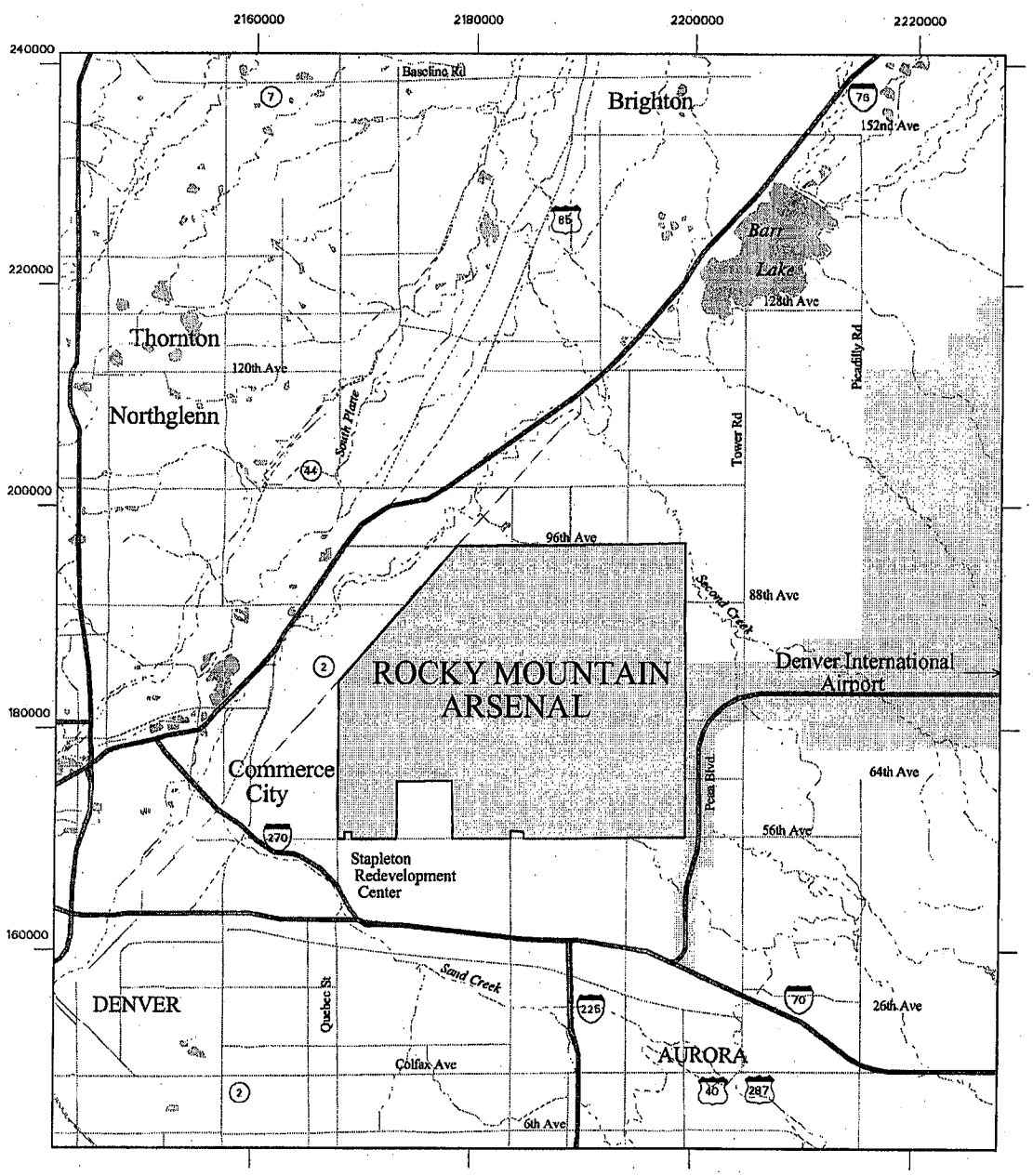

Legend

- Interstate Highway
- U. S. Highway
- Colorado State Highway
- Major Highway
- Secondary Route
- Stream

N

REMEDIATION VENTURE OFFICE

ROCKY MOUNTAIN ARSENAL

Figure 1

Regional Location Map

0 1 2 3 4 5

MILES

EPA Comments submitted by e-mail dated February 2, 2006

Tony,

Overall, this ESD looked very good - almost perfect. I do have 2 comments for clarification of the document.

1. Section 1.0, 5th Paragraph: states "evaluation of extraction well configuration resulted in a change from a single horizontal well installation ...." This seems to be a redundant sentence saying that your evaluation of the well configuration resulted in a change to the well configuration but there isn't any other information provided. Is there something else that was considered that changed the design such as drilling difficulties, geologic concerns, broader than expected plume extent, etc. This would better explain why the well configuration was changed and be more easily understood by the public.

Response: The text has revised with the following: "The original intercept system alternative in the Detailed Analysis of Alternatives Report (DAA) (FWENC 1995) proposed drilling and installing a 1400-foot long horizontal well under the bedrock ridge. Later studies indicated that the plume was narrow thus there was no need for a 1400-foot long horizontal well, and the nature of the aquifer was adequate for a less expensive vertical well extraction system. The modified design for the extraction system consisted of three 8-inch extraction wells to capture the plume. A fourth extraction well was added in 2005 to maintain plume capture."

2. Section 4.2: The next to last sentence has a word missing, "The actual total cost ??? the design..."

Response: The missing word "of" has been added "The actual total cost of the design, drilling, well installation, and conveyance piping for the four well groundwater extraction system was $1.2 million."

That's it. Please call if you have questions, lw

CDPHE comments submitted by e-mail dated January 31, 2006

Tony,

I have reviewed the Draft ESD for Bedrock Ridge dated January 18, 2006 and received January 19. CDPHE generally supports this ESD but has the following comments to help finalize the ESD:

General Comment - While the Selected Alternative (horizontal extraction well) from the 1995 Water DAA is used for cost comparison, why is there no mention of the 1997 30% Conceptual Design proposal for a single alluvial extraction well in the First Creek Drainage near well 36115?

Response: The basis of the ESD was the difference between the ROD estimated cost and the final cost for the four well extraction system. This cost difference was based on the 100% Design Package.

Specific Comments

Section 1, Introduction, paragraph 5 - After sentence one, please insert the sentence from Section 3.0 "A fourth well was added to ..."

Response: The fifth paragraph has been modified as follows "A fourth extraction well was added in 2005 to maintain plume capture.

Section 4.1, Changes to Remedy - Please add the word "selected" before "alternative" in sentence one.

Response: Text has been revised to include "selected".

Section 4.2, Summary of Cost Change - a) Please insert "selected Detailed Analysis of Alternatives" before "groundwater" in sentence one.
b) Is the cost of the fourth extraction well included in the cost comparison (it should be)?

Response: a) The text has been revised to include "selected Detailed Analysis of Alternatives"; b) The cost of the fourth extraction well is included in the cost comparison.

If you require this in a formal letter, please advise. If there are any questions, please contact me.

Sincerely,

Ed

Ed LaRock

Hazardous Materials and Waste Management Division
Colorado Dept. of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530
303-692-3324
Fax 303-759-5355
ed.larock@state.co.us

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

July 11, 2006

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Ms. Newton:

Enclosed is the Explanation of Significant Differences for the Shell Disposal Trenches Remediation Project Rocky Mountain Arsenal Federal Facility Site.

Copies of this letter were forwarded to:

a. Mr. M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal (DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748 (w/encl).

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203 (w/encl).

c. Mr. Brad Coleman, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite G228, Englewood, Colorado 80112 (w/encl 2 copies).

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037 (w/encl).

e. Mr. Mark Thomson, Washington Group, P.O. Box 1717, Commerce City, Colorado 80022 (w/o encl).

f. Mr. Daniel J. Dunn, Holme Roberts and Owens, 1700 Lincoln Street, Suite 4100, Denver, Colorado 80203 (w/encl).

g. Mr. Tom Jackson, U.S. Fish and Wildlife Service, Rocky Mountain Arsenal, Commerce City, Colorado 80022-1748 (w/encl).

h. Mr. Dan Collins, Tri-County Department Environmental Health Division, 4201 East 72nd Avenue, Commerce City, Colorado 80222-1488 (w/encl).

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EXPLANATION OF SIGNIFICANT DIFFERENCES FOR THE SHELL DISPOSAL TRENCHES REMEDIATION PROJECT

ROCKY MOUNTAIN ARSENAL FEDERAL FACILITY SITE

Prepared by:
Tetra Tech EC, Inc.

Prepared for:
Rocky Mountain Arsenal Committee
Department of the Army
Shell Oil Company
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

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Revision	Prepared By	Reviewed By	Approved By	Date	Pages Affected
0	S. Ache	M. Jones MJ	M. Jones MJ	May 5, 2006	All

CONTENTS

ACRONYMS AND ABBREVIATIONS

BOA	Balance of Areas
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CSA	Central Study Area
EPA	U. S. Environmental Protection Agency
ESD	Explanation of Significant Differences
HH	Human Health
HHE	Human Health Exceedance
HWL	Hazardous Waste Landfill
IRA	Interim Response Action
JARDF	Joint Administrative Record Document Facility
mm	millimeter(s)
NCP	National Contingency Plan
NPL	National Priorities List
OCP	Organochlorine Pesticide
OE	Ordnance and Explosives
OU	Operable Unit
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RMA	Rocky Mountain Arsenal
ROD	Record of Decision
SEC	Site Evaluation Criteria
SVOC	Semivolatile Organic Compound
TCHD	Tri-County Health Department

1.0 INTRODUCTION

This Explanation of Significant Differences (ESD) documents a significant change in a portion of the remedy for the Shell Disposal Trenches Remediation (Shell Trenches) project of the Rocky Mountain Arsenal (RMA) Federal Facility Site. The RMA On-Post Operable Unit (OU) is a federally owned facility located in southern Adams County, Colorado, approximately 10 miles northeast of downtown Denver, directly north of the former Stapleton International Airport and west of Denver International Airport (Figure 1). The RMA On-Post OU site encompasses 17.2 square miles and is currently on the U.S. Environmental Protection Agency (EPA) National Priorities List (NPL) for environmental cleanup as a result of contamination released during previous RMA operations. The Shell Trenches project consists of one area located in the central part of the On-Post OU.

The Record of Decision (ROD), which describes the remedy for the entire On-Post OU of RMA, was signed by the U.S. Army, the EPA, and the Colorado Department of Public Health and Environment (CDPHE) on June 11, 1996 (FWENC 1996). The selected remedy includes 31 cleanup projects for soil, structures, and treatment of groundwater contamination (PMRMA 2004). As the site-wide remediation is completed, most of the On-Post OU of RMA will become a National Wildlife Refuge, as provided for in Public Law #102-402.

The Army is the lead agency for RMA and is issuing this ESD as part of its responsibilities under Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986, and pursuant to the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Section 300.435(c)(2)(i). The NCP requires an ESD when the remedial action taken differs significantly from the remedy selected in the ROD with respect to scope, performance or cost. Regulatory oversight is conducted by the EPA, CDPHE, and the Tri-County Health Department (TCHD). The TCHD oversees local public health and environmental issues in Adams, Arapahoe, and Douglas Counties.

During design of the remedy for the Shell Trenches project, new information developed since the ROD was signed resulted in changes to the Shell Trenches cover boundaries. The ROD required that a Resource Conservation and Recovery Act (RCRA)-equivalent cover be constructed over the Shell Trenches area (Central Study Area [CSA]-1a), which was approximately 7 acres (FWENC 1996). However, the Shell Trenches groundwater barrier wall (slurry wall), completed under a separate project, was constructed outside the ROD Shell Trenches boundary to ensure that the trenches were completely enclosed. As a result, the cover requirement was extended over the slurry wall location to provide overall containment, increasing the Shell Trenches cover area to approximately 12 acres.

Further expansion of the cover boundaries to areas surrounding the Shell Trenches resulted from information developed during the Section 36 Balance of Areas (BOA) project implementation. Excavation of contaminated soil completed under the adjacent Section 36 BOA project included a former Shell drum storage area immediately south of the Shell Trenches area and the area located between the Shell Trenches, Complex (Army) Disposal Trenches and Basin A (Figure 2). The 1996 ROD remedy for these areas included construction of a 2-ft-thick soil cover following

excavation of all contaminated soil. However, an ESD for the Section 36 BOA project eliminated the soil cover based on soil sampling completed during design (FWENC 2003b). Field observations of stained and odorous soils and postexcavation sampling results indicated that these areas were contaminated beyond what was identified in the 1996 ROD or Section 36 BOA design. A review of the site history indicated that waste containing compounds not included in the ROD contaminant of concern (COC) list were disposed and/or stored in and adjacent to the Shell Trenches. The presence of these non-COCs along with variability in pre- and postexcavation sampling and the persistence of stains suggested that all contaminated soil could not be reliably located and removed as required by the Section 36 BOA ESD. Consequently, the Shell Trenches cover boundaries were expanded to include the Section 36 BOA areas adjacent to the Shell Trenches. Based on a review of site history and the observed field conditions, the RCRA-equivalent cover was extended to include the former drum storage area. The remainder of the area where stains were observed was designated for construction of a 2-ft-thick soil cover.

In addition to changes in the cover areas, project costs have increased from the ROD-estimated cost. Expansion of the RCRA-equivalent cover area, addition of the 2-ft-thick soil cover, and design requirements not accounted for in the ROD resulted in cost increases. The estimated RCRA-equivalent cover construction cost in the ROD is $1.2 million. The cost for construction of the RCRA-equivalent cover over the expanded area is estimated at $7.1 million. Addition of the 2-ft-thick soil cover in the area surrounding the Shell Trenches adds approximately $1.2 million, resulting in a total estimated project cost of $8.3 million. This represents a 7-fold increase from the ROD-estimated cost. Factors contributing to the cost increase include the expanded cover area, soil cover construction costs, addition of moisture probes and lysimeters, biota barrier changes (thickness, area and placement cost), and increased project oversight costs. These changes, while resulting in the need for an ESD, do not alter the overall hazardous waste management remedy that was selected in the ROD.

This ESD will become part of the Administrative Record as required by the NCP, 40 CFR 300.825(a)(2) (EPA 1990). The Administrative Record is available to the public at the Joint Administrative Record Document Facility (JARDF), located on the RMA in Building 129, Room 2024. The JARDF is open Monday through Friday between Noon and 4 pm or by appointment. The telephone number for the JARDF is 303-289-0362.

2.0 SITE HISTORY, CONTAMINATION AND SELECTED REMEDY

2.1 RMA Operational History

The RMA was established in 1942 by the Army to manufacture chemical warfare agents and agent-filled munitions and to produce incendiary munitions for use in World War II. Following the war and through the early 1980s, the facilities continued to be used by the Army. Beginning in 1946, some facilities were leased to private companies to manufacture industrial and agricultural chemicals. Shell Oil Company, the principal lessee, manufactured pesticides from 1952 to 1982 at the site. Common industrial and waste disposal practices during those years resulted in contamination of structures, soil, surface water, and groundwater.

The On-Post OU is one of two operable units at RMA. The Off-Post OU primarily addresses groundwater contamination north and northwest of RMA. The On-Post OU addresses contamination within the approximately 27 square miles of RMA. As of January 2004, 9.4 square miles of the On-Post OU have been determined to meet cleanup requirements and are no longer part of the NPL site. Implementation of the remedy for the remaining 17.2 square miles is ongoing and is scheduled for completion in 2011.

The contaminated areas within the On-Post OU included approximately 3,000 acres of soil, 15 groundwater plumes, and 798 structures. The most highly contaminated areas were identified in South Plants (the central processing area, Hex Pit, Buried M-1 Pits, and the chemical sewers), Basins A and F, the Lime Basins, and the Complex (Army) and Shell Trenches. The primary contaminants found in soil and groundwater in these areas are organochlorine pesticides (OCPs), solvents, metals, and chemical warfare agent by-products.

The areas with the highest levels and/or the greatest variety of contaminants are located in the central manufacturing, transport, and waste disposal areas. The highest contaminant concentrations tend to occur in soil within five feet of the ground surface, although exceptions are noted, particularly where burial trenches, disposal basins, or manufacturing complexes were located.

The characteristics and locations of the groundwater plumes suggest that the greatest contaminant releases to the groundwater have occurred from Basin A and the Lime Basins, the South Plants chemical sewer, the South Plants tank farm and production area, the Complex (Army) and Shell trenches in Section 36, and the former Basin F. The Motor Pool/Rail Yard and North Plants areas have been other sources of contaminant releases to the groundwater.

2.2 Shell Trenches History and Contamination Summary

The Shell Trenches area is identified in the Remedial Investigation (RI) as CSA-1a (Pesticide Pits) and is located east of Basin A in south central Section 36. The disposal trenches were operated by Shell as a disposal area for plant wastes from 1952 to 1966. From 1966 to 1973, Shell operated a drum storage area immediately south of the disposal trenches encompassing the southern portion of CSA-1a and adjacent area in CSA-1b (Section 36 BOA). A site plan showing the Shell Trenches and the former drum storage area is included as Figure 2. The following sections discuss the history and contamination summary for the Shell Trenches, drum storage area and other Section 36 BOA areas respectively.

2.2.1 Shell Trenches

The Shell Trenches area consists of approximately 18 trenches that were used for disposal of liquid and solid wastes associated with Shell insecticide and pesticide manufacturing in the South Plants area. These wastes were buried both in bulk form and in drums. Disposal operations began approximately in 1952 and continued until 1965. Trenches were dug as needed, with an east-west direction predominating, to a depth of 6 to 10 feet. Aerial photographs from 1953 reveal that the trenching activity began in the north and proceeded to the south (ESE 1987). More than 11,000,000 pounds of various bulk and drummed wastes including pesticides,

herbicides and other organic wastes were disposed in the trenches or stored in drums south of the trenches (Streich 1982).

The RI sampling results confirmed the presence of the disposal trenches and verified contamination within and around the trenches. Soil samples collected during the RI indicate concentrations of OCPs, hexachlorocyclopentadiene and dibromochloropropane exceeding the human health (HH) site evaluation criteria (SEC). Higher concentrations were detected within the trenches and in samples taken at or below the groundwater table (ESE 1987 and 1988a). Volatile organic compounds and semivolatile organic compounds (SVOCs) were also detected in the deeper samples. Although low concentrations of the agent degradation products, isopropyl methylphosphonate and diisopropyl methylphosphonate were detected, no agent was detected in soil. No airborne chemical agents were detected in the field using the M8 Alarm.

The Shell Trenches are a known source of groundwater contamination. Numerous OCPs and SVOCs have been detected downgradient from the area and the source of these contaminants is attributed to the Shell Trenches (MKE 1990). During the RI, groundwater was encountered in the soil borings between 4 and 12 feet below ground surface. The RI sampling results confirmed trench depths at 8 to 9 feet, indicating that the waste is in contact with the groundwater.

An Interim Response Action (IRA) for the Shell Trenches was completed in 1991 (EPA/Army 2000) to reduce the lateral migration of dissolved and separate phase contaminants emanating from the trenches. The IRA consisted of a rectangular slurry wall, a soil and vegetative cover, and a network of groundwater monitoring wells. The rectangular slurry wall was constructed around the outer perimeter of the trenches using the vibrating beam injection method and keyed into a low permeability clay layer. A 3-ft-thick soil cover was constructed over the area within the slurry wall and areas south of the trenches where land surface depressions existed. The soil cover was revegetated with crested wheat grass. Seven alluvial groundwater monitoring wells were installed outside of the slurry wall to monitor groundwater quality and five pairs of piezometers were installed adjacent to the slurry wall to evaluate hydraulic gradient across the wall.

The Shell Trenches IRA was effective at reducing the migration of contaminants from the trenches to groundwater, but was insufficient at meeting all of the ROD goals. The IRA cover did not prevent animals from burrowing into the waste-filled trenches and the slurry wall was potentially allowing continued migration of contaminants to the groundwater. For these reasons, the ROD specified that the existing cover be modified to be a RCRA-equivalent cover and that a new slurry wall be constructed around the trenches (FWENC 1996).

2.2.2 Former Drum Storage Area

The former drum storage area is located south of the disposal trenches and was investigated during the RI as part of the complex disposal area, CSA-1b. The area was used by Shell to store drums of liquids, sludges, and solid wastes consisting of off-specification materials, intermediates, products, laboratory wastes and filters. The storage area held approximately 9,000 55-gallon drums, 3,000 30-gallon drums, and 1,000 5-gallon drums (ESE 1988c). Based on an aerial photograph taken in 1971, the oval-shaped storage area measured approximately 400 feet

wide by 500 feet long with the northern one-third of the area located within CSA-1a (FWENC 2003a).

Shell operated the drum storage area from approximately 1966 through 1971. Drums were transported from South Plants by truck and stored either on pallets or directly on the ground. Shell has estimated that, during the operation of the drum storage area, approximately five percent of the stored liquid waste leaked onto the ground. Additionally, the storage area was used for temporary storage of contaminated soil resulting from leaks and spills of Shell chemicals occurring in South Plants. The soil was placed on the ground surface and not stored in drums. Beginning in 1972, the drums were removed and disposed at the Nuclear Engineering Company in Beatty, Nevada. All the drums were removed by the end of 1973 (Boyd 1986). During drum removal, Shell removed visibly contaminated soil resulting from drum leaks and spillage and topsoil from the storage area, and placed the soil into the last open disposal trench of the Shell Trenches (Knaus 1985).

Although this area was not specifically targeted for sampling during the RI, several soil borings were located within the former drum storage area. In addition, one perimeter sample from the Shell Trenches RI sampling effort was located in this area. The RI samples indicated concentrations of OCPs exceeding the HH SEC. Additional soil sampling was conducted in the former drum storage area during the Section 36 BOA design. Based on the RI and design soil sample results, this area was considered to exhibit surficial contamination only (FWENC 2003b).

This area was excavated in 2003 during the Section 36 BOA project. Following excavation to the ROD-required depths, confirmatory sampling detected contamination remaining in the drum storage area. Additional soil excavation was completed in 2004/2005.

2.2.3 Section 36 Balance of Areas

Although the Section 36 BOA project area includes more than 180 acres, this discussion provides a brief summary of the area associated with the 2-ft-thick soil cover. This area consists of approximately 31 acres located primarily north and west of the Shell Trenches within CSA-1b between the Shell Trenches, Basin A and the Complex (Army) Disposal Trenches (Figure 2) and continuing east of the Shell Trenches within CSA-4.

Area CSA-1b was used by the Army, Hyman and Shell from the early 1940s to the late 1970s for various types of waste storage and reported waste disposal (ESE 1988c). This area is located in south central Section 36, immediately east of former Basin A. The site fully encompasses the Shell Trenches and is bordered to the north by the Complex (Army) Disposal Trenches, to the east by CSA-4, to the south by 7th Avenue, and to the west by Basin A. The northern portion of the site includes a ROD-identified potential agent and ordnance/explosives (OE) area. The former drum storage area, described above, is within CSA-1b. Area CSA-4 lies directly east of CSA-1b and the Shell Trenches and includes the southeastern corner of Section 36. A portion of CSA-4 was reportedly used for open field (outdoor) munitions proof tests, quality tests, temporary munitions storage, and limited disposal of burn debris (ESE 1988b). Portions of CSA-4 are identified in the ROD as potential OE areas.

Samples collected during the RI indicated contaminated soil present throughout both CSA-1b and CSA-4. Both areas were characterized as shallow OCP contamination areas (Ebasco 1992). This contamination was attributed to wind dispersion from nearby source areas including Basin A, Shell Trenches, and the former Shell drum storage area.

A waste disposal area was reportedly located north of the Shell Trenches and south of the Complex (Army) Disposal Trenches (ESE 1988c). The area was reported to contain some Shell material, military wastes, and possibly live munitions. The RMA records do not provide a precise location for this disposal site, however, a March 25, 1951 aerial photograph indicates a dirt road leading to a disturbed area (approximately 100 ft in diameter) immediately north of the Shell Trenches. This disturbed area continues to be evident on aerial photographs in the following years. In February 2003, the Remediation Venture Office completed exploratory test pits in the potential disposal area. Two 70-ft long trenches were excavated to a total depth of 13 feet across the disturbed area. A small number of miscellaneous debris items were located in the upper 2 ft; however, no other evidence of waste disposal was discovered.

The Section 36 BOA was identified as a potential source of groundwater contamination based on contaminant patterns and migration pathways identified in the Remedial Investigation Summary Report (Ebasco 1992). During the RI, groundwater was encountered in the soil borings as shallow as 4 feet below ground surface. Numerous OCPs and SVOCs have been detected downgradient from the area; however, groundwater in this area is also contaminated from disposal activities at the Shell Trenches and Basin A. Therefore, it is difficult to determine the relative contribution from the Section 36 BOA.

The 1996 ROD required construction of soil covers over the Section 36 BOA project area following excavation of known contaminated soil. The 1996 ROD included a 2-ft-thick soil cover over the former HHE area and 1-ft-thick soil cover over the former biota risk area. The 1996 ROD-identified soil covers are shown on Figure 3 for reference. This ROD requirement was based on soil sampling completed during the RI and was intended to provide additional protection against exposure to potential remaining contamination and to minimize migration of any remaining contamination to groundwater. During Section 36 BOA project design, additional sampling was completed to locate potential contaminated soil not previously identified that would have remained under the covers. Samples were located in areas surrounding ROD-identified HHE areas and where fewer samples had been collected in the past. The resulting total sampling effort required the collection of 359 samples at 285 locations throughout the 1996 ROD-identified cover area. Two of the soil samples obtained during the design sampling efforts exceeded the acute HH SEC for OCPs. The results are described in the Section 36 Balance of Areas Soil Remediation Project Data Summary Report for Initial Cover Sampling (FWENC 2003d) and the Data Summary Report for Supplemental Sampling and Analysis Plan (FWENC 2003c). As a result, the design excavation areas and depths were revised to include excavation of contaminated soil in these areas. Based on these sampling results, and a commitment to sample again following excavation, an ESD was written to eliminate the soil cover requirement (FWENC 2003b). The Section 36 BOA ESD was completed based on the rationale that the area exhibited only surface contamination, that sampling was adequate to locate all remaining contamination and that this contamination would be removed.

2.3 Summary of the Selected On-Post Remedy

The overall remedy required by the 1996 ROD for the On-Post OU includes the following:

- Interception and treatment of contaminated groundwater at the three existing on-site treatment plants
- Construction of a new RCRA- and Toxic Substances Control Act-compliant hazardous waste landfill (HWL) on-post
- Demolition of structures with no designated future use and disposal of the debris in either the new, on-post HWL or the Basin A consolidation area, depending upon the degree of contamination
- The contaminated soil at RMA is addressed primarily through containment in the on-post HWL or under caps/covers, or through treatment depending upon the type and degree of contamination. Areas that have caps or covers require long-term maintenance and will be retained by the Army. These areas will not become part of the wildlife refuge.
- The Basin A disposal area is used for consolidation of biota risk soil and structural debris from other RMA contamination areas and is covered with a soil cover including a biota barrier.

2.4 Summary of the Selected Remedy for Shell Trenches

The ROD identifies the following major remedial actions for the Shell Trenches project:

- Expand the existing IRA slurry wall around the disposal trenches.
- Modify the existing IRA soil cover to be a RCRA-equivalent cover including a biota barrier.
- Revegetate all disturbed areas.

The slurry wall component was completed as required in the ROD under a separate project (FWENC 2001) and is not discussed in this ESD.

The ROD also required a demonstration of cover performance equivalent to a RCRA Subtitle C landfill cover, including comparative analysis and field demonstration. The comparative analysis for the RCRA-Equivalent Cover Demonstration Project was completed in December 1997 and included the scope of work for design and implementation of the field demonstration portion of the project (RVO 1997a). Subsequent modification to the scope of work resulted in establishing a percolation standard of 1.3 millimeters (mm) per year as the maximum allowable moisture through the cover for successful demonstration of RCRA equivalency (RVO 1998).

2.5 Summary of the Selected Remedy for Section 36 BOA

During implementation of the Section 36 BOA project, stained soils and odors were observed in certain areas adjacent to the Shell Trenches. Based on field observations and a review of site history, these areas were determined to be impacted due to disposal activities related to the Shell Trenches. As a result approximately 36 acres of Section 36 BOA project area were transferred to the Shell Trenches project for completion of remedy. This section includes a discussion of

Section 36 BOA ROD requirements to provide background on the additional area being remediated as part of the Shell Trenches project.

The 1996 ROD remedy for the Section 36 BOA project includes the following requirements:

- Excavate human health exceedance (HHE) soil and dispose in the on-post HWL.
- Backfill HHE soil excavations with clean soil.
- Excavate biota risk soil and consolidate to Basin A.
- Excavate and detonate (or otherwise demilitarize) any unexploded ordnance encountered.
- Demolish remaining structures and dispose in the on-post HWL or Basin A.
- Monitor for chemical agent during excavation and demolition, and treatment of agent-contaminated soil or structures debris by caustic solution washing.
- Construct a 2-ft-thick soil cover over the former HHE area.
- Construct a 1-ft-thick soil cover over the former biota risk area.
- Revegetate consistent with ROD requirements for covers.
- Provide institutional controls consistent with ROD requirements for covers.
- Provide long-term maintenance of the soil cover.
- Provide long-term groundwater monitoring.

In April 2003, an ESD was completed for the Section 36 BOA eliminating the 1-ft and 2-ft-thick soil covers that the 1996 ROD had required (FWENC 2003b). The remedy change was based on RI and design soil data indicating that the cover deletion area exhibited only surficial contamination. The revised remedy requires excavation of all contaminated soil from the cover deletion area followed by additional soil sampling and removal of any contaminated soil identified.

Excavation of contaminated soil was conducted under the Section 36 BOA project during 2004 and 2005. During excavation, monitoring for chemical agent did not result in identification of any agent-contaminated soil or structural debris. In addition, all munitions debris remediation, including OE clearance, was completed under the Section 36 BOA project.

3.0 BASIS FOR THE ESD

3.1 Basis for RCRA-Equivalent Cover Area Modification

Shell Trenches Area

The ROD requires a RCRA-equivalent cover over the entire Shell Trenches area as defined in the RI, which consists of approximately 7 acres. In addition, the ROD required a new slurry wall around the trenches to provide isolation of the waste and minimize impacts to groundwater. The ROD-required slurry wall was completed under a separate project and was constructed parallel to and outside of the existing IRA slurry wall, which is outside the ROD-identified Shell Trenches boundary (FWENC 2001) (Figure 2). Because the cover must extend over the slurry wall to provide proper isolation of waste and effective containment, project boundaries were expanded

so that the slurry wall and all areas within the slurry wall were incorporated as part of the Shell Trenches project.

Since the Shell Trenches area is encompassed by the Section 36 BOA project, the slurry wall location is within the Section 36 BOA area. Consequently, the Section 36 BOA project included excavation of contaminated soil adjacent to the slurry wall location. In order to protect the integrity of the slurry wall, the Section 36 BOA excavation was prohibited within 5 feet of the slurry wall centerline and therefore left a buffer area adjacent to the wall (FWENC 2003a). To provide containment of the waste remaining in the buffer area, the RCRA-equivalent cover was extended beyond the slurry wall to include the buffer area. Extension of the RCRA-equivalent cover over the slurry wall and 5-ft buffer soil added approximately 5 acres to the cover area.

An additional modification to the eastern boundary of the cover was made based on confirmatory sample results from the Section 36 BOA excavation. Analytical results from confirmatory sample number CSV-0920 indicated acute levels of HHE soil remaining in place. The sample was located approximately 10 feet from the Shell Trenches boundary, so the boundary was expanded approximately 15 feet into CSA-4 to cover the sample location rather than excavate additional contaminated soil in close proximity to the slurry wall. This extension resulted in a minimal increase to the overall cover area.

Former Drum Storage Area

The former drum storage area is located within CSA-1b and was included in the Section 36 BOA project area. As discussed in Section 2.5, the 1996 ROD remedy for CSA-1b included excavation of HHE and biota soil followed by construction of 2-ft-thick or 1-ft-thick soil covers. However, based on results of design sampling, an ESD was prepared in April 2003 eliminating the soil covers and requiring removal of all contaminated soil followed by additional soil sampling and removal of any contaminated soil identified.

Remediation of the former drum storage area was initiated under the Section 36 BOA project and excavation was completed in accordance with the design. Results of the RI and design sampling indicated that contamination in the former drum storage area was limited to surface or near surface soils and this assumption was significant for support of the Section 36 BOA ESD and final design. However, during implementation of the Section 36 BOA project, observed field conditions differed significantly from those expected based on the previous sampling results. Following design and CSV excavation, additional sampling was conducted in accordance with the Section 36 BOA ESD to ensure that all contaminated soil was removed. However, rather than confirming that no contamination remained, the sampling showed that the former drum storage area had concentrations of OCPs exceeding the HH SEC at the excavation surface (TtFW 2004). The additional contaminated soil was removed and disposed at the HWL.

In addition, extensive chemical staining was identified in the former drum storage area. These stained soils were observed at or below the design excavation surface, indicating that the design sampling may not have located all contamination existing beyond the ROD-identified HHE volume. The staining observed in the field seemed to extend beyond the limits of the drum

storage area represented in the 1971 aerial photograph. Additional review of historical aerial photography revealed a larger area of surficial disturbance south of the Shell Trenches in 1973, and the staining seemed to correlate more closely to the extent of the disturbance in the 1973 photograph. Sampling of the stained soils did not result in exceedance of the HH SEC; however, many of the compounds disposed at the Shell Trenches are not included on the ROD contaminant of concern list and have no corresponding SEC.

Pesticide odors were also detected and attributed to this area. While the source of the odors could not be determined, the pesticide nature of the odor suggested a possible relationship to the Shell Trenches disposal activities.

These field observations, including variability in pre- and postexcavation soil sample results, extensive HHE and biota risk soil volumes present at final excavation grades, and the persistence of stained soils and odors led to the decision to extend the Shell Trenches RCRA-equivalent cover over the former drum storage area to the limits of the 1973 disturbance. The extension of the cover over the former drum storage area added approximately 5 acres to the total cover area.

Overall, the RCRA-equivalent cover area increased from approximately 7 acres, as described in the ROD, to approximately 17 acres, a 143 percent increase.

3.2 Basis for 2-ft-Thick Soil Cover Addition

Excavation outside the Shell Trenches and former drum storage area was also completed under the Section 36 BOA project with similar observations of unexpected field conditions. Although the most significant staining was observed south of the Shell Trenches in the former drum storage area, stained soils were observed to the north, west and east of the Shell Trenches as well. Results of the RI and design sampling indicated that contamination in the Section 36 BOA area was limited to surface or near surface soils and this assumption was significant for support of the Section 36 BOA ESD and final design. Following excavation, additional sampling was conducted in accordance with the Section 36 BOA ESD to ensure that all contaminated soil was removed. However, rather than confirming that no contamination remained, the sampling showed that the area surrounding the Shell Trenches had concentrations of OCPs exceeding the HH SEC and biota risk criteria at the design excavation surface (TtFW 2004). The additional contaminated soil was removed and disposed at the HWL (HHE soil) or Basin A (biota soil). A second round of sampling was performed and two additional areas of contaminated soil were identified and removed (TtFW 2005b).

Although the identified contaminated soil was excavated, the presence of stains and additional identified exceedance volumes indicates that the design sampling may not have located all contamination existing beyond the ROD-identified HHE volume, and suggests that all contaminated soil cannot be reliably located and removed as required by the Section 36 BOA ESD. Therefore, a portion of the Section 36 BOA project area surrounding the Shell Trenches was identified for construction of a 2-ft-thick soil cover to provide additional protection and minimize potential migration of contaminants to groundwater. The 2-ft-thick soil cover was added as an expansion of the overall Shell Trenches cover since the field observations indicate potential contamination related to historical disposal activities at the Shell Trenches. The

remaining Section 36 BOA project area retains the cover deletion as documented in the Section 36 BOA ESD (FWENC 2003b).

3.3 Basis for Cost Change

Project costs have increased significantly compared to the 1996 ROD estimate as a result of addition of a 2-ft-thick soil cover area, expansion of the RCRA-equivalent cover area, and design requirements not accounted for in the ROD for the RCRA-equivalent cover. Overall, project costs increased from a ROD-estimated $1.2 million to approximately $8.3 million. Factors contributing to the cost increase include the expanded cover area, soil cover construction costs, biota barrier changes, addition of moisture probes and lysimeters, and increased project oversight costs.

3.3.1 Cost Change Related to Addition of 2-Ft Soil Cover

Addition of the 31 acre 2-ft-thick soil cover adds an estimated $1.2 million to the total project cost. Although the 1996 ROD included $2.9 million for cover construction in the Section 36 BOA project estimate, this cover was eliminated by the Section 36 BOA ESD (FWENC 2003b) and there is no cost associated with this cover in the Shell Trenches ROD estimate. Therefore, the $1.2 million is a direct cost increase for the Shell Trenches project. It should be noted that the 1996 ROD estimate for the Section 36 BOA soil cover construction included approximately 71 acres of 2-ft-thick soil cover and approximately 105 acres of 1-ft-thick soil cover whereas the Shell Trenches 2-ft soil cover area is approximately 31 acres. The 1996 ROD-identified soil covers are shown on Figure 3 for reference. The remaining Section 36 BOA project area retains the cover deletion as documented in the Section 36 BOA ESD (FWENC 2003b).

3.3.2 Cost Change Related to Shell Trenches RCRA-Equivalent Cover

The increased RCRA-equivalent soil cover area results in a corresponding increase in the amount of soil needed for cover construction. The ROD envisioned a 2-ft-thick low permeability soil layer in addition to a 4-ft-thick soil/vegetative layer as components to the RCRA-equivalent cover for the Shell Trenches. Since the RMA-demonstrated RCRA-equivalent cover achieves the required percolation standard without a low permeability soil layer, material savings are realized. However, the 143 percent increase in cover area adds significantly to the material requirements for the 4-ft-thick soil cover. These changes together (eliminating the 2-ft-thick low permeability soil layer and increasing the cover area) increased cover soil requirements by 70 percent. In addition, soil handling and placement costs are higher than anticipated in the ROD. The design requirements developed as a result of the RCRA-equivalent cover demonstration effort and full-scale designs include strict requirements for soil texture, agronomic properties and placed soil density. These additional soil handling, testing and placement requirements result in an estimated 52 percent increase in the cover cost. Mobilization and demobilization costs increased as well for the increased soil handling efforts. Overall, the RCRA-equivalent soil cover component estimated cost increased from approximately $561,000 to approximately $1.9 million.

The largest cost increase is due to changes related to the biota barrier component of the RCRA-equivalent cover. Overall, the estimated cost for the biota barrier component increased by approximately $2.5 million from a ROD-estimated $320,000 to a design estimated cost of $2.85

million based on changes to the overall cover area, biota barrier thickness, and the addition of a gravel chokestone layer. The increase in cover area, from a ROD-estimated 7 acres to a design area of 17 acres, resulted in a corresponding increase in the biota barrier material requirement. In addition, the design requires the biota barrier to extend 50 feet beyond the limits of the RCRA-equivalent cover to mitigate animals burrowing into the waste from outside of the cover area. This extension increases the total biota barrier coverage area to approximately 21 acres or three times the biota barrier area assumed for the ROD (see Figure 2).

The ROD requires a 12-inch-thick layer of crushed concrete or cobbles to serve as a biota intrusion barrier. However, early discussions with the U. S. Fish and Wildlife Service indicated that an 18-inch-thick layer would be more effective in limiting intrusion by burrowing mammals. Subsequently, a design team performed an assessment of potential biota barriers and concluded that a minimum 18-inch-thick layer would be sufficient to maintain deterrence (RVO 1997b). Therefore, the cover design proceeded with an 18-inch-thick biota intrusion layer. In addition, the draft design specifications require no less than 18 inches of material but allow as much as a 22-inch thickness, resulting in the need to procure additional material to cover the project needs. The combination of increased cover area and increased barrier thickness results in material requirements greater than 4.5 times that estimated in the ROD.

Gradation checking during placement is also required. Great importance will be placed on maintaining the gradation of the biota barrier material during placement activities. The placement of the biota barrier material will be continually inspected to ensure that the gradation does not contain excessive amounts of aggregate greater than six inches and less than three inches. This level of oversight was not included in the ROD estimate. The overall cost for biota barrier materials and placement activities results in an approximately $2 million increase compared to the ROD cost estimate.

In addition, a chokestone gravel layer was added to mitigate concerns over potential biota intrusion through the void spaces in the biota barrier. The angular nature and relatively large average fragment size of the crushed concrete creates void spaces between the concrete fragments in the placed biota barrier material. Therefore, a gravel chokestone layer was added to fill voids at the surface of placed biota barrier material. Since the chokestone layer was not specified in the ROD biota barrier estimate, this results in a direct $0.5 million cost increase for the project.

A geotextile layer overlying the biota barrier and chokestone was added to create a capillary barrier system. During the RCRA-Equivalent Cover Demonstration Project, it was determined that, during relatively wet periods, a capillary break was forming at the bottom of the test covers due to the contrast in hydraulic properties between the finer-grained cover soils and the coarser geocomposite material. Further review of data from the demonstration project resulted in the conclusion that the increase in moisture storage in the cover soils due to the formation of the capillary break was necessary during wet periods for the RCRA-equivalent covers to meet the 1.3 mm/year percolation standard. However, the successful results of the demonstration project clearly demonstrated that the combination of the cover soils and the capillary break in the test covers was sufficient to meet the 1.3 mm/year percolation standard. In order to design full-scale

covers having equivalent performance to the successful test covers, laboratory testing of capillary breaks constructed with various materials was conducted for comparison against a capillary break constructed using materials identical to those used to construct the test covers. The capillary break design selected incorporates a geotextile between the fine-grained cover soil and the coarse biota barrier/chokestone surface to enhance the formation of a capillary break in the RMA RCRA-equivalent cover designs (TtFW 2005a). To remain consistent with the material used in the capillary break testing, a minimum thickness of 1 inch of chokestone gravel is included in all areas above the biota barrier material surface. This 1-inch layer is in addition to the chokestone used to fill voids in the biota barrier surface, provides a consistent surface for placement of the geotextile, and functions with the geotextile to provide the capillary break. The geotextile also minimizes the occurrence of fine-grained cover soil raveling (migrating downward due to gravity, disturbance, percolation, etc.) into voids in the coarser material below, maintaining the quality of the capillary break. Since the geotextile layer was not specified in the ROD, this results in a direct $0.2 million cost increase for the project.

The addition of lysimeters and moisture probes to the RCRA-equivalent cover results in an approximately $0.4 million increase. These systems were not included in the ROD estimate and are therefore a direct cost increase. The RCRA-Equivalent Cover Demonstration Project determined that, to meet the ROD standard, infiltration through the cover should be no more than 1.3 mm per year (RVO 1998). Lysimeters were added to provide direct moisture percolation measurement to allow comparison to the developed standard as a means of compliance monitoring for the cover. Moisture probes were also added to provide additional data related to cover performance. Although the moisture probes will not be used for compliance monitoring, information collected will be used to 1) demonstrate that the full-scale cover performs as designed and 2) provide diagnostic information that may assist in selection and assessment of operations and maintenance activities and, if necessary, corrective actions (RVO 2004).

An increase in project oversight costs contributes another approximate $1 million. Although the ROD estimate did include project support as a cost element, the level of oversight required for construction of the various cover components to the required specifications exceeds that anticipated in the ROD. The addition of an independent Construction Quality Assurance Engineer for cover construction was not included in the ROD. Also, sampling frequency for agronomic and textural properties of cover soil and in-place density testing could not be provided at the level of support included in the ROD cost estimate. Additional cover components not contemplated in the ROD, including chokestone, geotextile, lysimeters, and moisture probes, also require significant oversight for management, documentation and certification of the cover construction. Finally, the increase in the cover area results in a comparable increase in oversight costs.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES

The following sections summarize the changes to the ROD-identified remediation areas and costs for the Shell Trenches project. The changes described do not alter the hazardous waste management remedy selected in the ROD and the remedy remains protective of human health and the environment.

4.1 Changes to RCRA-Equivalent Soil Cover Area

The primary changes to the RCRA-equivalent soil cover area result from expansion of the cover to include the extent of the ROD-required slurry wall and the extent of the former drum storage area south of the Shell Trenches. The expanded cover area increased the total RCRA-equivalent cover area for the Shell Trenches project from approximately 7 acres to approximately 17 acres. A summary of the modifications to the cover area is presented on Table 1. Although there has been considerable detail developed during design for cover soil specifications, the requirements included in the ROD for RCRA-equivalent covers remain unchanged.

Table 1: Changes to Shell Trenches Remedy and RCRA-Equivalent Cover Area

ROD-Prescribed Remedy	Modification
Expand the existing IRA slurry wall around the disposal trenches.	**No Change.** This activity was completed in 2000.
Revegetation standards consistent with ROD requirements for cover systems.	**No Change.**
Institutional and engineering controls consistent with ROD requirements for cover systems (e.g., delineation and access control).	**No Change.**
Long-term ground water monitoring.	**No Change.**

ROD-Prescribed Remedy	Modification	ROD Area[1]	Design Area[1]	Percent Change
Construct a RCRA-Equivalent Cover over the RI-identified Shell Trenches area.	**RI/ROD Area**	7 acres	7 acres	
	Addition: Extend RCRA-equivalent cover over new slurry wall alignment plus 5-ft buffer to allow excavation of soil in adjacent project area.		5 acres	
	Addition: Extend RCRA-equivalent cover over former drum storage area.		5 acres	
Total Project RCRA-Equivalent Cover Area Change		**7 acres**	**17 acres**	**+ 143 %**
No remedy outside Shell Trenches disposal area.	**Addition.** Construct a 2-ft-thick soil cover over 31 acres adjacent to the Shell Trenches where stained soils and odors were observed.			

[1]Areas rounded to nearest acre.

4.2 Addition of the 2-ft-Thick Soil Cover

The Shell Trenches project was modified to include a 2-ft-thick soil cover in areas adjacent to the Shell Trenches. The 2-ft-thick soil cover area includes approximately 31 acres located between

the Shell Trenches, Basin A and the Complex (Army) Disposal Trenches where stained soils and odors were observed during Section 36 BOA project implementation. Field observations during the Section 36 BOA project implementation resulted in addition of a 2-ft-thick soil cover over the impacted soil area. The cover was added as an expansion of the overall Shell Trenches cover due to field conditions that were considered related to historical disposal activities at the Shell Trenches. Requirements presented in the 1996 ROD for 2-ft-thick soil covers remain applicable to this added 2-ft soil cover area.

4.3 Summary of Cost Change

The baseline estimated cost for implementation of the RCRA-equivalent cover portion of the Shell Trenches Project was $1.2 million based on cost estimates presented in the ROD (FWENC 1996). The baseline estimate represents original ROD estimated costs reorganized to reflect implementation project descriptions in the Remediation Design and Implementation Schedule (PMRMA 2004). The current estimated cost for implementation of the Shell Trenches RCRA-equivalent cover and 2-ft soil cover is approximately $8.3 million. This cost is based on the detail presented in the 95 percent design package. Factors contributing to the cost increase include the expanded cover area, soil cover construction costs, biota barrier changes (thickness, area and placement cost), addition of moisture probes and lysimeters, and increased project oversight costs. Table 2 provides a comparison of cost components between the ROD and design.

Overall, these factors result in a cost increase of $7.1 million above the ROD-estimated cost, or a 7-fold increase. The largest projected cost increase is a result of the biota barrier material required for cover construction. Significant increases in material quantity due to increased cover area and change in the required thickness from 12 inches to 18 inches, as well as an increase in the placement costs, results in an approximately $2 million increase. The addition of a chokestone layer to the biota barrier adds approximately $0.5 million. The expansion of the RCRA-equivalent cover area to include the slurry wall configuration and the former drum storage area contributes an approximate $1.4 million increase for additional soil material, handling and placement costs. Addition of the 2-ft-thick soil cover over 31 acres surrounding the Shell Trenches contributes another $1.2 million. Another significant factor was project oversight, which contributes a $1 million increase. The inclusion of lysimeters and moisture probes in the RCRA-equivalent cover design contributes an additional $0.4 million increase. Addition of a geotextile layer to create a capillary break increases the project cost by $0.2 million. The remaining cost increase, $0.34 million, is attributable to increased revegetation costs, subcontractor incentives, and engineering controls to assist in long-term Operations and Maintenance for the cover.

A review of the range of alternatives evaluated in the ROD for the Shell Trenches indicates that 2 of the other 4 site-wide alternatives (not selected) would likely have experienced similar cost growth. Alternatives 1 and 2 included composite covers over the Shell Trenches and would have been subject to the same cost growth related to the expansion of the project area. The composite covers described in the ROD include a biota barrier and would have experienced the significant cost growth associated with this cover component as well.

Table 2: Changes to Shell Trenches Project Costs

Cost Element	ROD Cost	Design Cost[1]	Percent Change
RCRA-Equivalent Soil Cover Construction			
Soil Cover Placement (17 acres)	$ 561,000	$ 1,929,000	
Lysimeters/Moisture Probes	NA	$ 427,000	
Biota Barrier/Capillary Barrier			
Material and Placement	$ 320,000	$ 2,335,000	
Chokestone	NA	$ 512,000	
Geotextile	NA	$ 222,000	
2-ft-thick Soil Cover Construction (31 acres)	NA[2]	$ 1,200,000	
Project Oversight/Support	$ 292,000	$ 1,289,000	
Revegetation	$ 17,000	$ 219,000	
Other Project Costs (includes subcontractor incentives and engineering controls)	NA	$ 136,000	
Total Estimated Project Costs	**$ 1,190,000**	**$ 8,269,000**	**+ 625 %**

[1]Costs estimated from detail presented in the Shell Trenches 95 percent design package.
[2]There is no ROD cost for 2-ft-thick soil cover for the Shell Trenches project. The Section 36 BOA 1996 ROD estimate includes $2.9 million for construction of 176 acres of 1-ft-thick and 2-ft-thick soil covers.

The two remaining alternatives (Alternative 3, Excavate and Landfill and Alternative 5, Excavate and Incinerate) included excavation of the Shell Trenches and therefore would not have experienced cost growth associated with the RCRA-equivalent cover system. However, these alternatives were not selected in the ROD due to significantly higher estimated costs for the alternative ($35 million and $89 million respectively) as well as significant short-term risks associated with excavation of the trenches.

5.0 SUPPORT AGENCY COMMENTS

The EPA, CDPHE, and TCHD have reviewed this ESD. Comments from these Agencies have been incorporated into the document.

6.0 PUBLIC PARTICIPATION COMPLIANCE

The Army published a public notice in the Rocky Mountain News and Denver Post on February 21, 2006, making the Draft Shell Trenches ESD available for public review and comment. Notices were also published in the Commerce City Beacon, Brighton Blade and Far NE Reporter. A presentation explaining the proposed changes contained in the ESD was provided to the RMA Restoration Advisory Board (RAB) on January 12, 2006. The RAB is a community group that meets periodically to receive information and provide input on the cleanup being conducted at the RMA. The public comment period closed on March 23, 2006 and no comments were received. The requirements set out in the NCP, Section 300.435(c)(2)(ii), have been met.

This ESD and all documents that support the changes and clarifications are part of the Administrative Record and are available at the JARDF and the EPA Region 8 Superfund Record Center. The JARDF is open Monday through Friday between Noon and 4 pm or by appointment. The telephone number for the JARDF is 303-289-0362. The EPA Superfund Record Center can be reached at 303-312-6473. Hours of operation are Monday through Friday from 8 a.m. to 4:30 p.m.

7.0 STATUTORY DETERMINATIONS

Considering the new information presented in this ESD, the Army, in consultation with EPA and CDPHE, believes that the Shell Trenches project remedy, with the modifications described, satisfies the requirements of CERCLA Section 121 and is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, uses a permanent solution through proper containment of the wastes beneath the RCRA-equivalent cover and 2-ft-thick soil cover, and is cost effective.

Signatures

For U.S. Environmental Protection Agency

Date 6·26·06

Terry L. Anderson
Director, Federal Facilities Program

For U.S. Army

Date 5/9/06

Charles T. Scharmann
Program Manager for Rocky Mountain Arsenal

For State of Colorado

Date 6/20/06

Gary W. Baughman
Director, Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

8.0 REFERENCES

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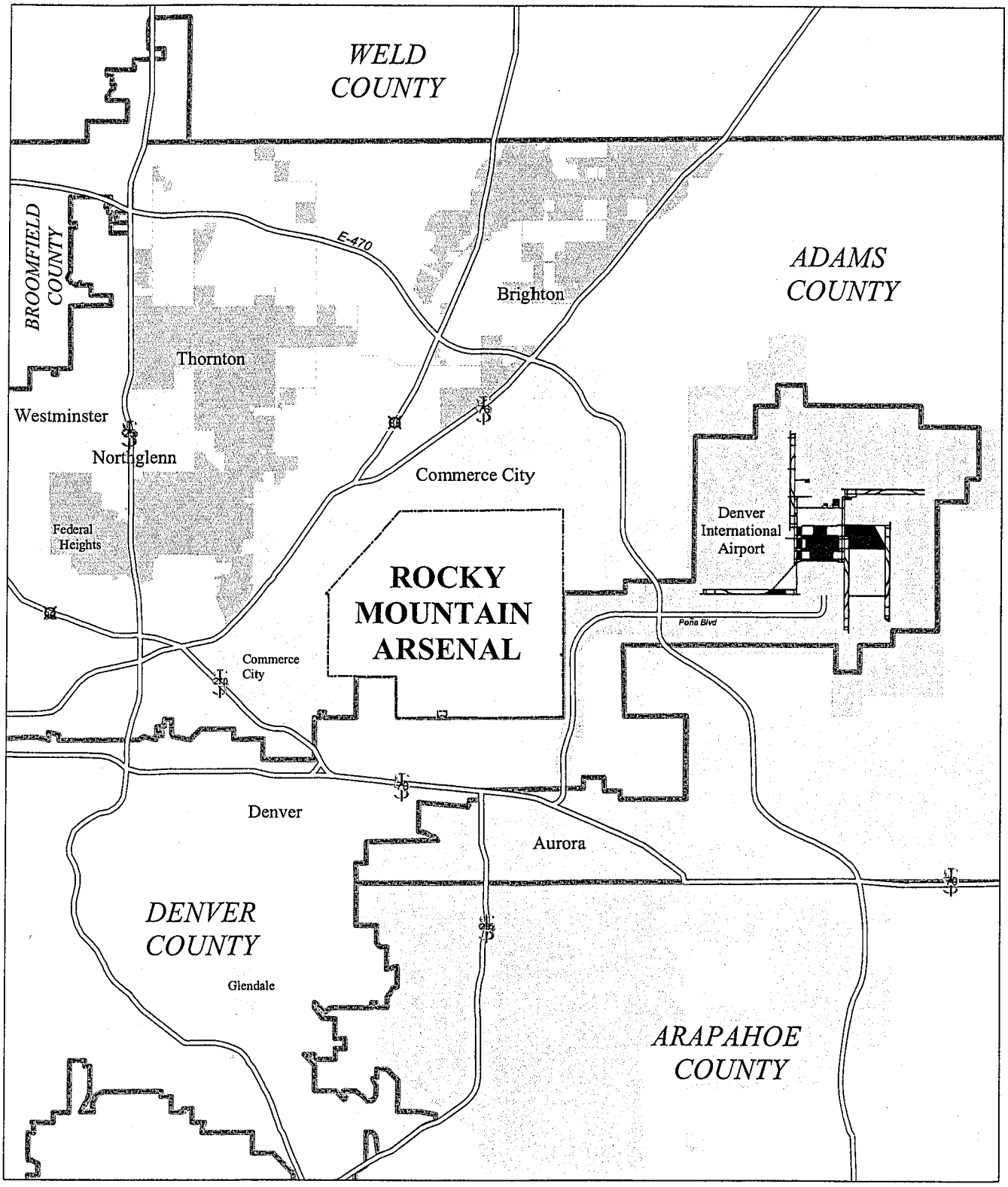

ROCKY MOUNTAIN ARSENAL
Regional Reference

0 1 2 3 4
Miles

Figure 1

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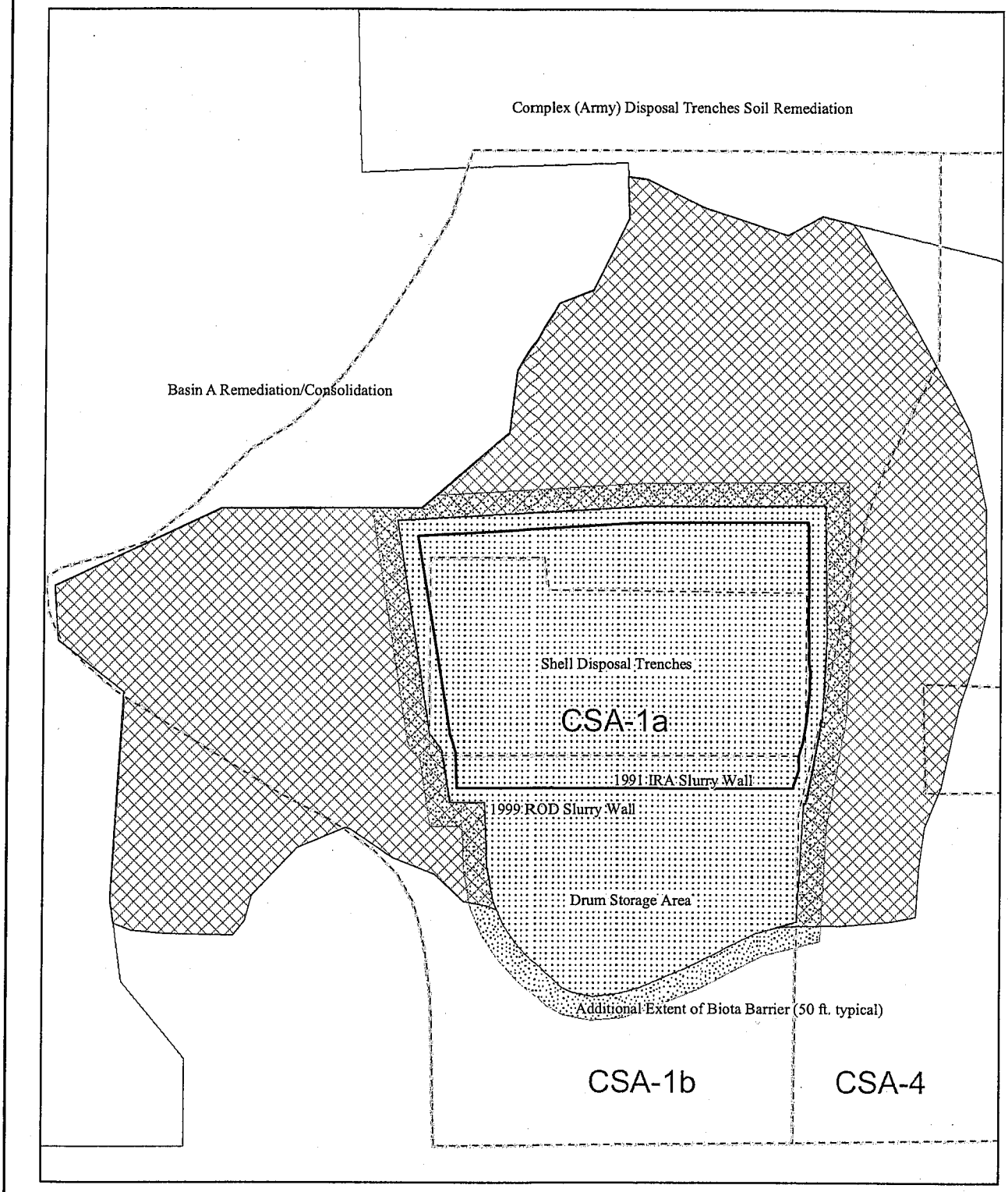
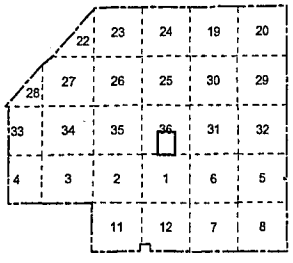
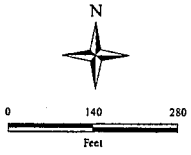


ROCKY MOUNTAIN ARSENAL

Shell Trenches Remediation
Areas and Cover Extent

Original ROD Boundary
RCRA-Equivalent Cover
2-Ft. Soil Cover

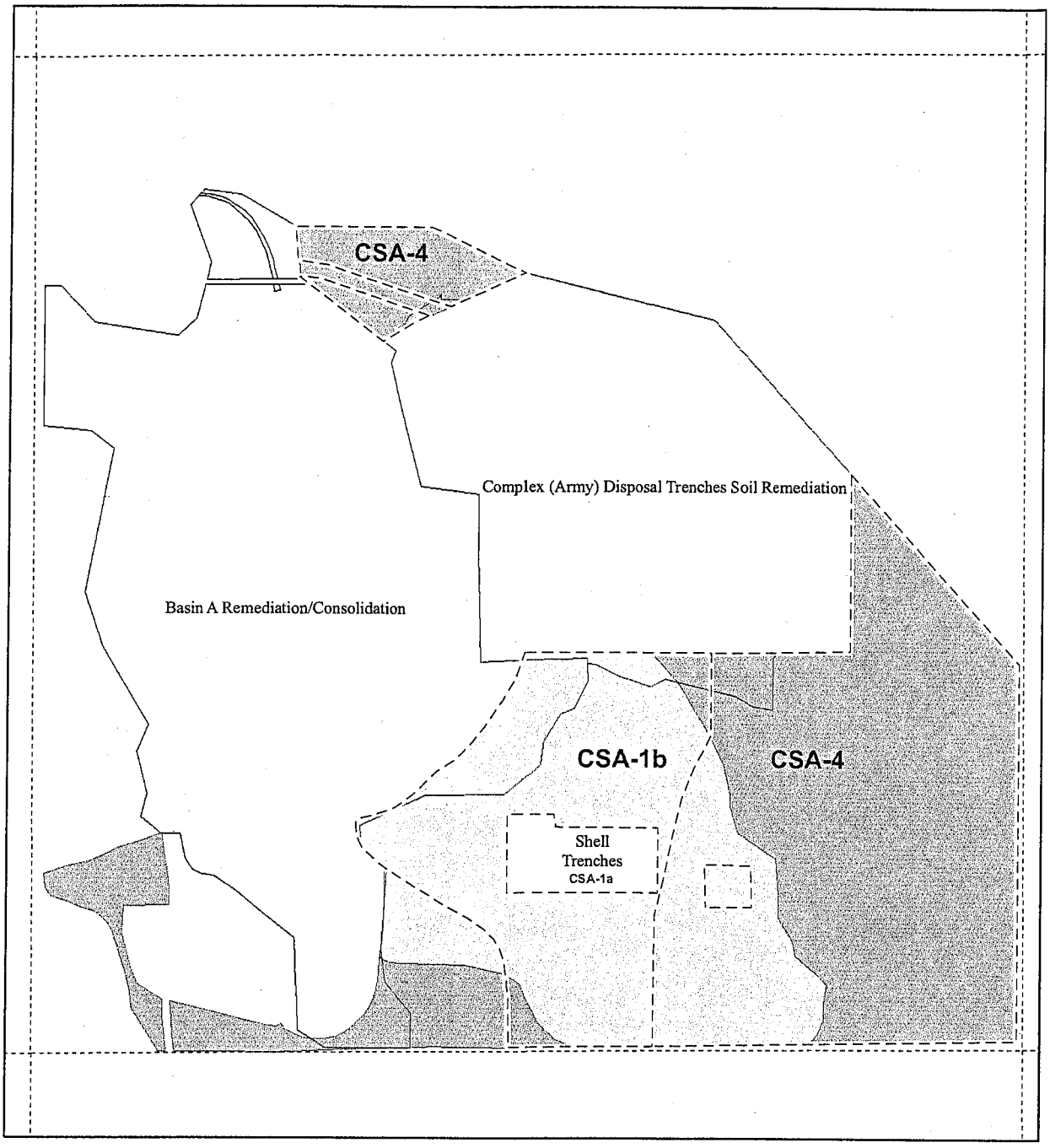




Lambert Conic Conformal Projection
State Plane Coordinate System
Colorado North Zone - NAD 1927

Figure 2

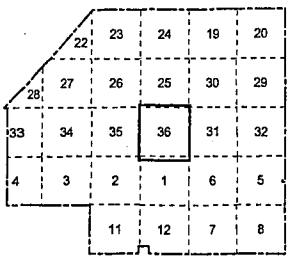
Map Document: D:\Map Documents\ESD_ShellTrenches.mxd Date Printed: November 7, 2005

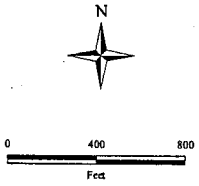


ROCKY MOUNTAIN ARSENAL

Section 36 Balance of Areas
1996 ROD Identified Soil Covers

- Implementation Project Boundary
- Original ROD Boundary
- 1 Ft. ROD Cover
- 2 Ft. ROD Cover

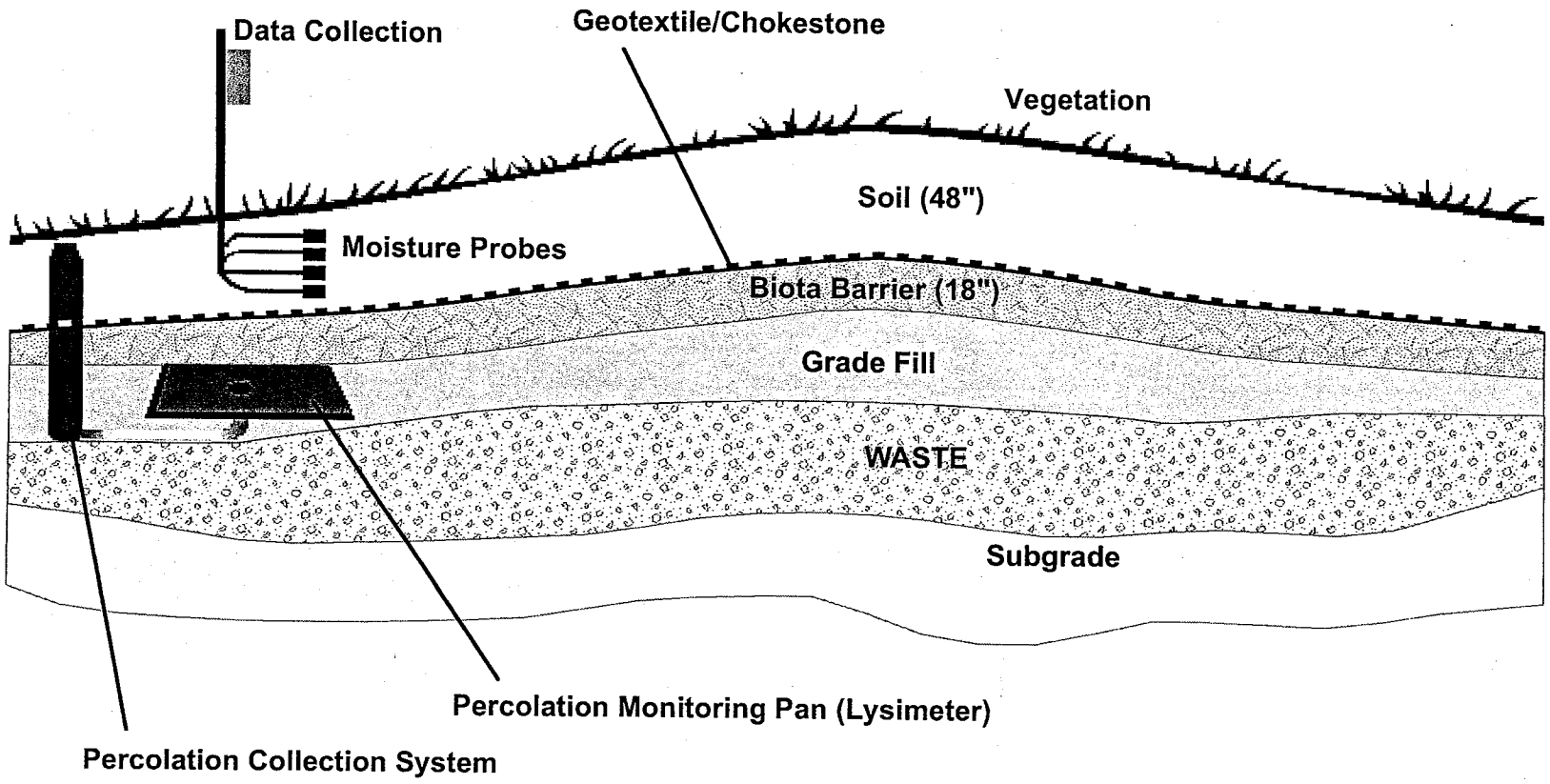




Lambert Conic Conformal Projection
State Plane Coordinate System
Colorado North Zone - NAD 1927

Map Document: D:\Map Documents\ESD_ShellTrenches3.mxd Date Printed: November 7, 2005

Figure 3



ROCKY MOUNTAIN ARSENAL
Shell Trenches Remediation
Cross Section of
RCRA-Equivalent Cover

N

0 25 50
Feet

Lambert Conic Conformal Projection
State Plane Coordinate System
Colorado North Zone - NAD 1927

Figure 4

Map Document: D:\Map Documents\RSD_ShellTrenches\RCRAProfile.mxd Date Printed: February 6, 2006

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

DAIM-BD-A-RM-RE

20 July 2006

MEMORANDUM FOR U.S. Environmental Protection Agency, (Mr. Greg Hargreaves), Region VIII, Mail Code 8HWM-FF, 999-18th Street, Suite 300, Denver, Colorado 80202-2405

SUBJECT: Amendment to Resolution Agreement Proposed Alternative Remedies for Lime Basins and Former Basin F at the Rocky Mountain Arsenal

1. Enclosed for your information are copies of the Amendment to Resolution Agreement Proposed Alternative Remedies for Lime Basins and Former Basin F at the Rocky Mountain Arsenal.

2. Please contact the undersigned at 303-289-0240, if you have any questions about the enclosed amendment.

Bruce M Huenefeld

BRUCE M. HUENEFELD
RMA Committee Coordinator

Encl

CF:
Rocky Mountain Arsenal, (DAIM-BD-A-RM-CL/Mr. M. Weslyn Erickson), Chief Counsel, Commerce City, Colorado 80022-1748 (wo/encl)
U.S. Environmental Protection Agency, (Ms. Laura Williams), Region VIII, Mail Code 8HWM-FF, 999-18th Street, Suite 300, Denver, Colorado 80202-2405 (w/encl)
Pacific Western Technologies, Ltd, (Mr. John Stetson), 605 Parfet Street, Suite 200, Lakewood, Colorado 80215 (w/encl)
Shell Oil Company, (Mr. Roger B. Shakely), P.O. Box 538, Commerce City, Colorado 80037 (wo/encl)
Washington Group, (Mr. Mark Thomson), P.O. Box 1717, Commerce City, Colorado 80022 (wo/encl)
Holme Roberts and Owens, (Mr. Daniel J. Dunn), 1700 Lincoln Street, Suite 4100, Denver, Colorado 80203 (wo/encl)
U.S. Fish and Wildlife Service, (Mr. Tom Jackson), Rocky Mountain Arsenal, Commerce City, Colorado 80022-1748 (wo/encl)
Tri-County Department Environmental Health Division, (Mr. Dan Collins), 4201 East 72nd Avenue, Commerce City, Colorado 80222-1488 (wo/encl)
Rocky Mountain Arsenal, (Document Tracking Center), Commerce City, Colorado 80022-1748 (wo/encl)

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RMA Council Resolution Agreement - Proposed Alternative Remedies for Lime Basins and Former Basin F at the Rocky Mountain Arsenal (RMA)
- Amendment to Resolution -

On July 13, 2004, an RMA Council Resolution Agreement provided for excavation and placement of the Former Basin F Principal Threat (PT) soils in the on-site Enhanced Landfill (ELF). The resolution was amended on March 15, 2005.

Item 6. Add the following paragraph:

Based upon design activities completed through June 2006 for the Former Basin F Principal Threat (PT) soils project, the Parties agree to change the implementation sequence for the Lime Basins and PT soils projects, as outlined in the amended Council Resolution Agreement. The design activities include conduct of flux tests on the identified PT soils to better characterize soil odor emissions, successful demonstration of odor controls on actual PT soils, and submittal of an acceptable 30 percent PT soils design document. In combination with the experience gained during excavation of the Basin F Wastepile project initiated on April 3, 2006, the design efforts provide a basis for implementation of the RCRA-Equivalent cover and isolation/slurry wall components of the Lime Basins remedy independent of the PT soils excavation. As the schedules for the Lime Basins and PT soils projects are no longer linked, the Parties also agree to operate the ELF as a single-waste-cell facility - as defined within the ELF Operations Plan, and/or DCN-ELFOPS-001, 002, & 003, which will maximize the ELF waste disposal capacity.

CONCURRENCE FOR RESOLUTION AGREEMENT AMENDMENT

Charles T. Scharmann
U.S. Army
7/5/06
Date
Concur/Nonconcur

Laura Williams
U.S. Environmental Protection Agency
7/12/06
Date
Concur/Nonconcur

Joan Sowinski
Colorado Department of Public Health and Environment
28 June 06
Date
Concur/Nonconcur

Dean Rundle
U.S. Fish and Wildlife Service
6 JUL 06
Date
Concur/Nonconcur

Roger Shakely
Shell Oil Company

7-5-06
Date

Concur/Nonconcur

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ROCKY MOUNTAIN ARSENAL
7200 QUEBEC STREET, BUILDING 111
COMMERCE CITY, CO 80022-1748

August 29, 2006

Remedy Execution

Ms. Susan Newton
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Ms. Newton:

Currently the Draft Final Design (95 Percent) enforceable milestone date for the Former Basin F Principal Threat Soil Remediation project is September 18, 2006. In accordance with Paragraphs 26.8-26.18 and 34.22 of the Federal Facility Agreement, the Remediation Venture Office is requesting an extension of the 95 Percent deadline to November 30, 2006. The reason for this extension is to allow adequate time to resolve the Regulatory Agencies' comments received on the 60 Percent Design Package. This schedule delay will not affect the overall remedy completion in 2011.

Copies of this letter were forwarded to:

a. Mr. M. Weslyn Erickson, Chief Counsel, Rocky Mountain Arsenal, DAIM-BD-A-RM-CL), Commerce City, Colorado 80022-1748.

b. Mr. Richard Lotz, Attorney General's Office, CERCLA Litigation Unit, 1525 Sherman Street, 5th Floor, Denver, Colorado 80203.

c. Mr. Trevor J. Klotz, Sentinel Consulting Services, LLC, 14 Inverness Drive East, Suite F-232, Englewood, Colorado 80112.

d. Mr. Roger B. Shakely, Shell Oil Company, P.O. Box 538, Commerce City, Colorado 80037.

e. Mr. Mark Thomson, Washington Group, P.O. Box 1717, Commerce City, Colorado 80022.

f. Mr. Daniel J. Dunn, Holme Roberts and Owens, 1700 Lincoln Street, Suite 4100, Denver, Colorado 80203.

g. Mr. Tom Jackson, U.S. Fish and Wildlife Service, Rocky Mountain Arsenal, Commerce City, Colorado 80022-1748.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

Ref: 8EPR-F

September 21, 2006

Mr. Bruce Huenefeld
Office of the Program Manager for RMA
Rocky Mountain Arsenal
Commerce City, CO 80022-2180

Re: Basin F/Basin F Exterior Remediation Project – Part I, Rocky Mountain Arsenal

Dear Mr. Huenefeld:

The Environmental Protection Agency (EPA) has completed its review of the Construction Completion Report (CCR) for the Basin F/Basin F Exterior Remediation Project – Part I (Project) submitted November 1, 2005, and modified by errata pages on June 8, 2006, by the Remediation Venture Office. The CCR, in compliance with OSWER Directive 9355.0-4B (Remedial Design/Remedial Action Handbook), documents the remedial action activities for the Project which have been accomplished to date, including:

- Completion of all construction items defined in the Project Scope of Work and Final Design Package, as modified, including the status of revegetation efforts which is monitored as part of the annual *Vegetation Management Plan*;
- Completion of the Project remedy in accordance with the goals established in the 1996 On-Post Record of Decision;
- The conduct of a final inspection by the Colorado Department of Public Health and Environment (CDPHE) and EPA;
- CDPHE concurrence with the CCR via enclosed letter.

Accordingly, EPA approves the CCR as submitted and accepts the Project as complete.

Sincerely,

Terry J. Anderson
Director, Federal Facilities Program

Enclosure: CDPHE Concurrence Letter

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RECEIVED
9/6/06

STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

August 29, 2006

Mr. Terry Anderson
Director, Federal Facilities Program
Office of Ecosystem Protection and Remediation
U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405

Re: **Rocky Mountain Arsenal, Basin F/Basin F Exterior Remediation Project – Part 1, Construction Completion Report**

Dear Mr. Anderson:

My staff has reviewed the Construction Completion Report for the Rocky Mountain Arsenal, Basin F/Basin F Exterior Remediation Project – Part 1. This report was evaluated for compliance with the objectives described in the Record of Decision, as amended by the Remediation Design and Implementation Schedule, and the final design specifications and drawings for the project. Based upon this evaluation and our observations while the work was being performed, I am pleased to inform you of the State's concurrence with the referenced Construction Completion Report.

Sincerely,

Gary W. Baughman
Director, Hazardous Materials and
Waste Management Division

cc: Bruce Huenefeld, RMA
Roger Shakely, Shell
Tom Jackson, USF&WS
Westley Erickson, PMRMA
RMA File 7.6-30

Laura Williams, EPA
Dan Collins, TCHD
Richard Lotz, AGO
Brad Coleman, Sentinel
Susan Newton, CDPHE

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